NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:
January 3, 1989

Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

Mary Ann Peto
Lewis Research Center, Cleveland
(Phone: 216/433-2902)

NOTE TO EDITORS:

SPACE STATION FREEDOM POWER SYSTEMS TESTING FACILITY TO OPEN

NASA's Lewis Research Center, Cleveland, will dedicate the Power Systems Facility (PSF) during an opening ceremony on Monday, Jan. 9, 1989. The PSF is the first facility in the country built specifically to test Space Station Freedom hardware.

The ceremonies will begin at 10 a.m. in the Administration Building with remarks from Lewis Director Dr. John M. Klineberg and guest speakers. In conjunction with the dedication ceremony, the PSF project team will be recognized for the successful design and completion of Lewis' newest facility.

There will be a press conference at the PSF following the 11:30 a.m. ribbon-cutting ceremony. Invited guests and the media will have an opportunity to tour the facility, which will contain the Freedom space station electrical system hardware and exhibits.

- end -

NASA News

National Aeronautics and Space Administration

Washington, D.C. 20546
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For Release:

Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

January 4, 1989

Jeffrey E. Carr
Johnson Space Center, Houston
(Phone: 713/483-5111)

NOTE TO EDITORS:

SPACE SHUTTLE MISSION 29 BACKGROUND BRIEFINGS SCHEDULED

A series of pre-flight background briefings and a press conference with the astronaut crew for the upcoming STS-29 Space Shuttle mission are scheduled for January 11 at the NASA Johnson Space Center, Houston.

Background briefings will include an overview of the flight given by Lead Flight Director Charles W. Shaw as well as briefings on the primary payload, TDRS-D satellite, secondary payloads and other mission objectives.

The briefings will begin at 9 a.m. EST and should be completed by 5 p.m. The crew press conference will begin at 11:30 a.m.

Round robin interviews with the flight crew will be conducted the following day. News media who wish to participate in these interviews should contact Jeffrey Carr at 713/483-5111.

The briefings and astronaut press conference will be carried live on NASA Select television which can be accessed via Satcom F2R, transponder 13, 72 degrees west longitude. Two-way question and answer capability with other NASA centers will be provided.

- end -

National Aeronautics and
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Washington, D.C. 20546
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For Release:

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Headquarters, Washington, D.C.
(Phone: 202/453-8400)

January 5, 1989

RELEASE: 89-1

ROBINS NAMED NASA ASSOCIATE ADMINISTRATOR FOR MANAGEMENT

Dr. C. Howard Robins, Jr., has been named associate administrator for management of the National Aeronautics and Space Administration, effective Jan. 9, 1989.

Robins will replace Manuel Peralta, who is leaving NASA Headquarters to become president of the American National Standards Institute, New York City.

Robins' primary responsibility will be to help strengthen the agency's core organizational and infrastructure capabilities.

He was appointed to his current position as deputy associate administrator for management in 1984 after serving in various capacities at NASA for more than 30 years. Robins joined the agency as a student aeronautical engineering trainee. He worked at Langley Research Center, Hampton, Va., and Johnson Space Center, Houston, before transferring in 1976 to the Headquarters Office of Aeronautics and Space Technology, where he managed the Orbiter Experiments Program and Long Duration Exposure Facility Program.

In 1980, Robins was appointed chief of the Mission Operations and Information Systems Branch of the Planetary Division, Office of Space Science and Applications. He was selected for the President's Executive Exchange Program in 1983 and completed an industrial assignment at Newport News Shipbuilding and Drydock Company before returning to NASA Headquarters to assume his current position.

Robins received a B.S. degree in aeronautical engineering from the Virginia Polytechnic Institute and a master's degree in management engineering from George Washington University. He also attended the Harvard Advanced Management Program.

- end -

NASA News

National Aeronautics and
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For Release:

David Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

January 9, 1989

EDITORS NOTE: NASA ISSUES UPDATED, MIXED FLEET MANIFEST

The latest update of NASA's mixed-fleet manifest, reflecting current planning for primary payloads for Space Shuttle missions and expendable launch vehicles through September 1994, is available in the NASA Headquarters and field center newsrooms.

The manifest is a planning document. Firm Shuttle payload assignments are made during the formal integration process approximately 19 months prior to launch. The new manifest reflects NASA's current assessment of the rate at which Shuttle flights can be flown.

- end -

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
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For Release:

NASA BUDGET PRESS CONFERENCE
STATEMENT OF DR. JAMES C. FLETCHER, NASA ADMINISTRATOR
JANUARY 9, 1989

Today, I can say that the space program is back on track. Our challenge now is to keep it on track and in forward motion toward our long-range goals.

We are back on track, but we have come only a short way. There is much to be done.

We have had two successful Shuttle flights, but only two. We still have many flights to go to demonstrate reliability and to work off the backlog of important scientific and national defense missions.

We have made a strong beginning with the Space Station. We have Congressional approval, contractors selected and at work, and agreements with our international partners. But the real work of development, testing and construction is just beginning.

Our science programs are in good shape, with several major projects awaiting their turn for a Shuttle launch. The FY 1990 budget continues to provide strong support for this program.

Our studies of long-term future human exploration of the solar system are progressing, but we still have much work to do before we fully understand the options, benefits and costs.

Yes, we are on the track laid out in the space policy of a year ago and in the FY 1989 budget, which was approved without major programmatic changes by Congress. It should come as no surprise, therefore, that the President's FY 1990 budget calls for $13.3 billion for NASA. This is an increase of $2.4 billion over FY 1989 and is almost exactly the amount forecast a year ago when we presented the FY 1989 budget to Congress.

- more -

Nearly all of this increase is needed for programs presented and approved last year:

- the build-up of Space Shuttle flight rate and development of the Advanced Solid Rocket Motor;

- the development of Space Station;

- the Science and Applications, Aeronautics and Space Techology programs; and

- the necessary supporting activities.

The fact that the President has included this substantial increase in NASA's budget -- in the face of the serious problem of the deficit -- is strong testimony to the validity of the need and to the national importance of NASA's programs in space and aeronautics and the technologies they develop. In looking at the details, you will see that the FY 1990 budget of $13.3 billion affirms the President's continued support for the Space Shuttle, the Space Station, Space Science and Aeronautics.

We plan to fly the Shuttle five times this year and nine times next year. The mission plan is exciting. The next payload will be a Tracking and Data Relay Satellite to give us a healthy all-up tracking system in orbit. This launch will be followed by the Magellan mission to Venus. Later this year, we plan to launch the Galileo mission to Jupiter and the Hubble Space Telescope.

The budget provides the funding necessary for the Shuttle to support these missions and to proceed with development of the Advanced Solid Rocket Motor to enhance the reliability and performance of the Shuttle.

The budget provides $2 billion to move ahead with development of the Space Station. The development plan and basic configuration are firm, and the development contractors are making substantial progress. We are moving toward a first element launch in early 1995 with a capability for man-tended research activity by the end of that year and a permanently manned capability by the end of 1996. Our international partners are at work consistent with this plan and with the agreements approved last fall.

The Science and Applications program is on the verge of a new era with the resumption of flight activity on both the Shuttle and expendable launch vehicles. In addition to the Magellan, Galileo and Hubble Space Telescope missions, by the end of 1990 we will have launched the Gamma Ray Observatory, the Cosmic Background Explorer, the ROSAT and the Ulysses mission to look at previously unreachable areas of the sun.

We will have flown an important Life Sciences Spacelab mission. We will be working on the mirror and instruments for the Advanced X-Ray Astrophysics Observatory. Development will be nearly complete on the Upper Atmosphere Research Satellite and well underway on spacecraft and instruments for the Geospace Science mission. The FY 1990 budget will also get us started on the Mariner Mark II spacecraft missions (CRAF and Cassini) to expand our knowledge of comets and of Saturn and its satellites.

Our Space Research and Technology program gives us the technological basis for a future beyond our current capabilities. The budget will allow us to continue the Civil Space Technology Initiative aimed at enhancing near-earth capabilities and the Pathfinder program to develop the technologies needed for potential future expansion into the solar system. These activities are progressing, although at a slower pace than I personally would like to see.

Since the early days of aviation, the technology developed by NASA and its predecessor -- the National Advisory Committee on Aeronautics -- has been a major factor in the preeminence of this nation in atmospheric flight. We need to keep it that way. The FY 1990 budget provides a strong program of R&D in the familiar areas of aeronautics, with a new thrust in high-speed flight.

The budget also supports NASA's share of the National Aerospace Plane Program effort to develop the technology to take us a step beyond our present atmospheric flight capabilities into the realm of hypersonic, transatmospheric flight.

The key element in all NASA programs -- past, present and future -- is our people. The budget recognizes the need to rebuild our workforce with focus on quality - on the capabilities for the future. We are planning an increase of 700 equivalent people over the level we have for 1988.

One of the major thrusts of the President's budget is to increase participation of the private sector -- not simply in performance of work -- but in financing new activities and in accepting some of the risks, as well as sharing in the benefits. In accordance with the National Space Policy, the FY 1990 budget assumes that we will be able to bring the private sector into some very important elements of our program.

In the space infrastructure, this effort involves portions of the development of extended mission duration capabilities of the Shuttle; the develoment of a Flight Telerobotic Servicer, solar dynamic power, and a docking module for the Space Station. The budget plan also includes support for government use of a commercially developed space facililty (CDSF) with funding beginning in 1992. In ground-based facilities, it includes facilities for developing the Advanced Solid Rocket Motor, for processing the Space Station for neutral buoyancy training of Space Station astronauts, and for R&D on observational instruments.

We have always believed that the private sector is very important to the nation's space program, now and in the future. During the coming year, working to achieve greater private sector investment will be one of our major efforts. We will continue to develop our specific procedures in support of private sector participation.

Timely success in this endeavor is essential to make the program work within the approved budget level; it is crucial that we obtain private investment to move ahead with these vital elements of the Space Station program and important Shuttle improvements. It is, therefore, extremely important for Congress to act quickly to approve the necessary legislation in support of private sector investment in these critical areas.

I believe that this budget reflects the fact that the space program is back on track. We are moving, perhaps not as fast as I personally would like, but the content of our program is solid, productive and exciting. I ~~must tell~~ warn you, however, that this is a very tight budget. I believe that we can accomplish the objectives and the programs I have outlined, provided we have full support all the way through the process. We plan to give it our best shot -- and we are counting on the support of the Administration, Congress and the public.
you all the press,

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
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For Release:

Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

January 10, 1989

Jerry Berg
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/544-0034)

RELEASE: 89-2

SPACE SHUTTLE SOLID ROCKET MOTOR SLATED FOR FINAL TEST FIRING

A full-scale static test firing of NASA's redesigned Space Shuttle solid rocket motor is scheduled for January 17. The test will be the sixth and final such firing required to qualify the major design features of the redesigned solid rocket motor.

The 126-foot-long, 1.2-million-pound Qualification Motor-8 (QM-8) will undergo a full-duration horizontal test firing of 2 minutes. The 1 p.m. MST firing will take place in test bay T-97 about 25 miles west of Brigham City. Prior to the firing, the QM-8 motor will be cooled down to 40 degrees F. during a period of 30 days prior to the firing. That is its lowest specified operating temperature and is lower than any expected motor temperature at launch.

The test is part of the Shuttle motor redesign program. The verification and qualification test program to certify the motor redesign consists of five full-duration tests, conducted prior to resumption of Shuttle flights last Sept. 29, and the upcoming test under cold-weather conditions.

Morton Thiokol is NASA's prime contractor for the solid rocket motor, and the Marshall Space Flight Center in Huntsville, Ala., manages the motor program for NASA.

- end -

National Aeronautics and
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For Release:

Charles Redmond
Headquarters, Washington, D.C.
(Phone: 202/453-1549)

January 11, 1989

Ray Villard
Space Telescope Science Institute, Baltimore, Md.
(Phone: 301/338-4514)

RELEASE: 89-3

ASTRONOMERS DISCOVER ACTIVE STELLAR CORPSE

A group of astronomers has discovered evidence of vigorous activity in a white-dwarf star previously thought to be a stellar "corpse" incapable of such lively behavior. This new and unexpected behavior may offer astronomers new insight into how stars are born, evolve and ultimately die.

When stars like the sun exhaust their nuclear fuel, they end their lives as inert white dwarfs, compact objects about the size of the Earth. Astronomers have long believed that white dwarfs are incapable of further evolution other than a gradual cooling off.

The white-dwarf star, cataloged as 0950+139, lies at the center of a faint nebula called EGB 6 and is located about 1500 light-years from Earth in the direction of the constellation Leo. The nebula was formed an estimated 50,000 years ago when the star was in the red-giant stage, which occurs late in a star's evolution. When red giants subsequently exhaust their nuclear fuel and "burn out," they contract to become white dwarfs.

Astronomers commonly believe that white-dwarf stars mark the end of any further stellar activity other than a gradual cooling off over billions of years. The researchers found, however, that 0950+139 is surrounded by a glowing cloud of gas about the size of our own solar system. The star apparently has very recently shed additional gas long after entering the white-dwarf stage.

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Howard E. Bond of the Space Telescope Science Institute, Baltimore, Md., James Liebert and T. Fleming of the University of Arizona, Richard Green of Kitt Peak National Observatory, J.B. Holberg and K. Kidder of the Lunar and Planetary Laboratory, and F. Wesemael of the University of Montreal, presented their findings today at the 173rd meeting of the American Astronomical Society, in Boston, Mass. The research was supported by the National Aeronautics and Space Administration and by the National Science Foundation.

These findings are based on spectroscopic observations of the star made at Palomar, Kitt Peak, and Steward Observatories, and by NASA's International Ultraviolet Explorer satellite. "A spectrum like this, with unmistakable signs of a surrounding gas cloud has never been seen before in such a highly evolved star," says Bond. "My co-workers and I believe the gas indicates that the star has very recently undergone additional mass loss."

One possible explanation is that the white dwarf is continually losing mass into space through some unknown mechanism. "Such behavior," says Bond, "is unexpected once a star has become a white dwarf because of the tremendous gravitational force at the surface of a white dwarf."

Another possibility is that nuclear-fusion processes re-ignited below the white dwarf's surface, causing it to balloon back to the red-giant phase. Most of the star then re-collapsed back into the white dwarf observed today, while the outer layers escaped to form the observed second shell of material around the star.

"This re-birth as a 'born-again' red giant may only have lasted for a few years and could well have gone unnoticed by astronomers," says Bond.

Recent theoretical studies by I. Iben and J. MacDonald at the University of Illinois have revealed a possible explanation for such unusual behavior. Hydrogen may diffuse below the white dwarf's surface to mix with carbon rising up from the dwarf's interior, leading to re-ignition of nuclear fusion. Because this diffusion process is extremely slow, a star could have existed as a white dwarf for some time until the re-kindling of nuclear fusion.

The Space Telescope Science Institute is operated for NASA under a contract with the Goddard Space Flight Center, Greenbelt, MD., by AURA (the Association of Universities for Research in Astronomy, Inc.). It is located on the Johns Hopkins University campus in Baltimore.

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency.

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National Aeronautics and
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For Release:

Charles Redmond
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January 11, 1989

RELEASE: 89-4

NASA SELECTS PAYLOAD SPECIALISTS FOR SPACELAB MISSION

NASA today announced that it has approved the Investigator Working Group recommendation of Dr. Ulf D. Merbold, European Space Agency (ESA) and Dr. Roger K. Crouch, NASA, as candidate payload specialists for materials sciences experiments on the International Microgravity Laboratory (IML) -1 mission aboard the Shuttle Columbia in April 1991.

NASA also announced that it has extended to the government of Canada through the Ministry of State (Science and Technology) an invitation to nominate two candidate payload specialists for the life sciences experiments on the IML-1 mission. Canada has accepted this invitation and nominated Dr. Roberta L. Bondar and Dr. Kenneth Money for the mission.

After the initial training period, NASA will designate, in consultation with ESA, a prime and a backup payload specialist for the materials sciences portion of the IML-1 mission and will also designate, in consultation with Canada, a prime and backup payload specialist for the life sciences portion.

IML-1 is the first of a series of microgravity investigations using the Spacelab module. It will focus on materials and life sciences, two disciplines needing access to a laboratory in reduced gravity. IML-1 will use the Spacelab long module and is a dedicated microgravity mission.

The investigations will use five life sciences experiment facilities, designed to be used and flown again - biorack, protein crystal growth facilities, gravitational plant physiology facility, microgravity vestibular investigations and space physiology experiments; and three materials facilities - fluid experiment system, vapor crystal growth system, mercury-iodide crystal growth system and the critical point facility. These reusable facilities have been built by U.S., European, Canadian and Japanese investigators and organizations for reflight aboard the NASA-ESA Spacelab system.

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In addition to the experiments which require the reusable facilities, three other life science and three other materials science experiments with unique hardware will fly aboard IML-1.

The IML series are designed to fly at 17- to 25-month intervals, enabling investigators to analyse and understand the results of flight experiments and use that knowledge to design additional experiments.

Columbia will fly in a 160 (nautical) mile-high 28.5 degree orbit. Mission duration is 9 days and the crew will consist of two payload specialists and five additional astronaut/mission specialists. The orbiter will fly in a tail-down attitude called "gravity gradient" thereby producing the least gravitational disturbances on the Spacelab during the mission flight duration.

The IML series is intended as an ongoing international research program in materials and life sciences in a microgravity environment. The program is managed by NASA's Office of Space Science and Applications' Flight Systems Division, Washington, D.C. Sterling Smith is program manager and Dr. Ron White, Life Sciences Division, is program scientist.

Mission manager is Robert McBrayer and mission scientist is Dr. Robert Snyder, both from the Marshall Space Flight Center, Huntsville, Ala.

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NASA News

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For Release:

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

January 12, 1989

NOTE TO EDITORS/PROGRAM DIRECTORS

NASA POLICY ON SHUTTLE FLIGHT ELIGIBILITY ANNOUNCED

NASA today issued a policy statement on the conditions under which persons are eligible to fly on the Space Shuttle. A copy of the statement is attached.

-end-

1/9/89

NASA Policy for Payload Specialists and Space Flight Participants

A. General

1. The Challenger accident marked a major change in the U.S. outlook and policies with respect to the flight of other than NASA astronauts. NASA and interested external parties, domestic and international, must reexamine previous understandings, expectations, and commitments regarding flight opportunities in light of the new policies now being enunciated.

2. NASA policies and their implementation recognize that:

--every flight of the Shuttle involves risks;

--flight opportunities will now generally be limited to professional NASA astronauts and payload specialists essential for mission requirements, and

--top priority must be given to:

- establishing, proving, and maintaining the reliability and safety of the Shuttle system,

- timely and efficient reduction of the backlog of high priority scientific and national security missions, and

- maximum utilization of the Shuttle capacity for primary and secondary payloads that require transportation to or from orbit by the Space Shuttle.

3. All Shuttle flights will be planned with a minimum NASA crew of five astronauts (commander, pilot, and three mission specialists). When payload or other mission requirements define a need and operational constraints permit, the crew size can be increased to a maximum of seven. Any such additional crew members must be identified at least 12 months before flight and be available for crew integration at 6 months.

4. NASA policy and terminology are revised to recognize two categories of persons other than NASA astronauts, each of which requires separate policy treatment. They are:

a. "Payload Specialists," redefined to refer to persons other than NASA astronauts (commanders, pilots, and mission specialists), whose presence is required on board the Space Shuttle to perform specialized functions with respect to operation of one or more payloads or other essential mission activities.

b. "Space Flight Participants," defined to refer to persons whose presence on board the Space Shuttle is not required for operation of payloads or for other essential mission activities, but is determined by the Administrator of NASA to contribute to other approved NASA objectives or to be in the national interest.

B. Payload Specialists

Payload specialists may be added to shuttle crews when more than the minimum crew size of five is needed and unique requirements are involved. In the case of foreign-sponsored missions and payloads, the need and requirements for payload specialists will be negotiated and mutually agreed between the foreign sponsors and NASA. The selection process for additional crew members to meet approved requirements will first give consideration to qualified NASA mission specialists. When payload specialists are required they will be nominated by the appropriate NASA, foreign, or other designated payload sponsor. In the case of NASA or NASA-related payloads, the nominations will be based on the recommendations of the appropriate Investigator Working Group (IWG).

C. Space Flight Participants

NASA remains committed to the long-term goal of providing space flight opportunities for persons outside the professional categories of NASA Astronauts and Payload Specialists when this contributes to approved NASA objectives or is determined to be in the national interest. However, NASA is devoting its attention to proving the Shuttle system's capability for safe, reliable operation and to reducing the backlog of high priority missions. Accordingly, flight opportunities for Space Flight Participants are not available at this time. NASA will assess Shuttle operations and mission and payload requirements on an annual basis to determine when it can begin to allocate and assign space flight opportunities for future Space Flight Participants, consistent with safety and mission considerations. When NASA determines that a flight opportunity is available for a space flight participant, first priority will be given to a "Teacher in Space" in fulfillment of space education plans.

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NASA News

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For Release:

James W. McCulla
Headquarters, Washington, D.C.
(Phone: 202/453-8398)

January 17, 1989
Immediate Release
Scheduled for Delivery
at 6 p.m. EST

NOTE TO EDITORS/PROGRAM DIRECTORS

U.S. SPACE LEADERSHIP IN DANGER, NASA CHIEF WARNS

Dr. James C. Fletcher, NASA administrator, declared today that the budget proposed for the space agency is "as taut as possible" and "even a nick can mean organic rupture and collapse" of the U.S. civil space program.

Speaking to the Explorers' Club in New York City, he warned that if the space budget is made the "banker" to finance other federal programs, the U.S. would relinquish world space leadership for good and would run the risk of becoming a "historic relic" with other societies that lost their vitality, sense of adventure, willingness to risk, and their places in the forefront of technology development.

Mankind certainly will reach other planets, Fletcher declared. "But a terrible question remains unanswered: what language, what culture, what values will shape the ethos of the first human settlement on Mars?"

Fletcher made these and other points:

o The space station has been subject to so much redesign and modification that "there is simply no room for further trimming, or shaping or cutting. We either are going to build it - and build it right - or not build it at all."

o The space program "is an integral, interdependent whole" that is vulnerable to serious dislocation by even small budget cuts. "The funds being requested do not permit us the luxury of backups, of alternatives, of programmatic robustness. Virtually every element of the program is being pursued on a success schedule..."

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o "The accomplishments of the past and the continuing promises of the future have come at an astonishing low price for the values received - this year, for example, the entire NASA space and aeronautics program represents less than 1 percent of the federal budget."

"In truth," the NASA administrator said, "the moment is coming when the nation chooses to lead - or to follow. I want to be as certain as I can that that choice is made knowingly and not by default."

The text of Dr. Fletcher's speech is attached.

-end-

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REMARKS PREPARED FOR DELIVERY:
EXPLORERS CLUB, NEW YORK CITY
JANUARY 17, 1989

DR. JAMES C. FLETCHER
NASA ADMINISTRATOR

INTRODUCTION

I consider it a great privilege--and a great opportunity--to be able to address you this evening. A privilege, because this august body holds dear so many of the values that energize the Nation's activities in space and it is good to share ideals among those on both side of the public-private fence. An opportunity, because I feel the currents of history are rapidly taking us toward a decisive fork, an irreversible set of choices that will determine for our lifetimes the role and position to which the US can aspire in carrying forward man's destiny beyond the frontiers of Earth.

If this sounds a bit ominous, a little disturbing, it is meant to. As a nation, I believe we have become a bit apathetic, a bit disinterested in the substance of the great decisions and focused more on our immediate and personal horizons. We really do leave a shockingly large percentage of our critical decisions up to others without that intellectual involvement so necessary to a true national consensus, a true long-term commitment to a course of action for a significant purpose.

As the United States moves from this Administration to its successor, a hundred special interests are preparing to take sides in fierce contention for some piece of the Federal budget and some portion of the President's attention. It should be of serious concern to everyone, not that there are so many needs and interests in conflict, but that the standards of decision among them seem to favor immediacy over futurity. One of the great issues in the developing debate is that of our Nation's stake--and probably our civilization's stake--in the exploration of the universe. And a significant element in the outcome of that debate is that the real issue is seldom confronted and made explicit by the executive, the legislature, or the media upon which so many of us must rely for informed opinion.

This evening I hope to put some flesh and sinew onto the bare bones of the argument for space.

- more -

IMPERATIVES

Perhaps the most compelling imperative in history has been the human demand to explore, to experience, to know, and eventually to control the totality of the available environment. Early man's epic treks have taken him to every continent and across every ocean. Some mechanistic models of human history assign the causes of our ancestors' expansive migrations to factors of climate and resources and competition; I think we cannot overlook the intrinsic factors that lie deep within us all and motivate us to seek knowledge and experience, to explore and tame the unknown.

We need only to look about us to see the great lessons and relics of history: societies that recognize the nature of the human challenge build and grow and prosper. Those that lose vitality, that lose the sense of adventure and risk, that trade investment for immediacy become frozen in time and today are only fading legends and curiosities.

But we must wonder at the performance of our predecessor civilizations--the great intellectual and physical works that characterize these nations and empires of the past remain alive today as the foundations of our own sciences, technologies, and philosophies. We see the evidence of enormous engineering skills in the roads and highways and aqueducts and canals that tied together the early empires of Asia and Europe and South America. We rely every day on the structure of abstract thought and the discipline of logic that has given us the tools of art and science. What will we leave as valuable and as permanent to those inheritor civilizations we will count as our inheritors?

CHALLENGE AND RESPONSE

There is a well-known phrase, indelicate but pithy, that says, "root hog, or die." It applies to societies as it does to individuals. It means that the ultimate price of complacency is extinction, that the reward of investment is the survival of our heirs.

The space program represents, in one small nutshell, all that we can say about challenge and response, about the quest for greatness and the penalties of failure. It is widely accepted that there are extremely powerful economic consequences stemming from the exploration of space. New technologies developed in response to the space challenge energize the whole of our industrial society with new capabilities, new products new employment. Space systems are so integral to our daily life as to have become invisible--operational telecommunication, navigation, and environmental monitoring space services are embedded in our civilization. The children of today learn a cosmology far different--and far more excitingly accurate--than we could teach even one short generation ago; space exploration has opened windows into the physical universe that will never close. Even the games of children rely on computers commonplace today but that only twenty years ago had not yet been invented for our first tentative Apollo expeditions to the Moon. The character of space exploration, whether by machines or men, has allowed us to leave strife behind and make the reaches beyond our planet a lasting symbol of peace dedicated to the benefit of all mankind. The nature of space systems makes them particularly suited to the study and investigation of our own planetary processes; it is from space that we have gotten our earliest warnings of the possible growing crisis of climate and it is only from space that we will be able to fix upon and understand the real extent and direction of environmental change. Above all, space has posed a challenge to the nation in terms of physical and intellectual unknowns to overcome. With success has come a sense of national satisfaction and pride, and a position of earned leadership in the world.

I would point out that the accomplishments of the past and the continuing promises of the future have come at an astronishing low price for the values received--this year, for example, the entire NASA space and aeronautics program represents less than 1% of the Federal budget. One might suspect that the prior record alone would suffice to assure continuing support from the two halves of the our government, from both sides of the political aisle, and from every part of the American public. I believe I can speak to that last point: the civil space program is overwhelmingly popular in this country. It carries virtually no downside implications and everyone can share in its victories over obstinate nature, its revelations of new knowledge and capabilities, its expansion of our horizons, its adventure and sense of wonder and elevation of the human spirit. The public EXPECTS a first-class program performance. I know that, in his final budget submitted only ten days ago, President Reagan recognized the values of the NASA programs and requested nearly all the resources we need to fulfill these key commitments already made and expected. The new President is another unequivocal and outspoken proponent of civil space and its contributions. The Congress, without regard to partisanship, has steadfastly funded and supported a strong civil space effort--perhaps not always identical in detail with the one requested but by and large the one representing a national consensus on what we should do and where we should go.

THE TASK AHEAD

If the civil space record is so good and our supporters so steadfast, why is there reason for such keen concern? I assure you that the concern is real. The program we are trying so hard to bring to fruition is an integral, interdependent whole--and, therefore, vulnerable to serious dislocation in the face of even small perturbations. The funds being requested do not permit us the luxury of backups, of alternatives, of programmatic robustness. Virtually every element of the program is being pursued on a success schedule--and we know in advance that there will be unforeseen technical problems to solve and dilemmas to face which will require internal adjustments and constraints. After nearly three years of extremely hard work, the most visible part of NASA is once again in operation. The Shuttle is successfully flying crews and payloads.

But we have only flown twice, and there is a critical backlog of payloads waiting for transportation to space. We have planned fourteen flights over the next two years, trying to balance the demand for launch services with the necessary care and prudence we must observe in the inevitably risky business of manned space flight.

We must launch our third tracking and data satellite next month to complete the global network that supports all the free world's space explorations. Two months later, we will launch the long-delayed Magellan spacecraft to map Venus. We will then launch the Galileo mission on a complex gravity-assisted trajectory that will eventually take it to Jupiter. At the end of the year, we expect to carefully place in Earth orbit the Hubble Space Telescope which will permit astronomers to explore our universe out almost to its edges and back almost to its origins. The gamma ray astronomical observatory will be in space the following year, as will the international cooperative Ulysses mission to monitor solar activity at the sun's previously unseen poles. Manned Spacelab missions will investigate many physical and life processes in the yet little understood low gravity environment of space. The Shuttle is integral to our manned and instrumented exploration programs; we dare let nothing interrupt our steady recovery and return to reliable flight operations. The Shuttle is our principal means of reaching space and our only piloted space vehicle capable of flexible space operations--manned experiments, revisits, or retrievals. About a third of our total effort is focused on keeping the Space Shuttle program moving usefully forward, and half again as much goes to the science and applications experiments that are steadily expanding the sphere of human knowledge. We have worked long and hard to bring the shuttle back into safe operation. Truly significant and exciting payloads are waiting to fly. We still have many modifications to make on the shuttle to make it as safe and reliable as it needs to be. The time to move ahead is now.

The other side of this coin is Space Station Freedom, promising us the first real step away from earth on the way to the future. The free world has made a strong beginning here; the concern of all of us is the follow-through. Station Freedom has been designed and redesigned by experts and amateurs and enthusiasts and critics. The configuration we are building today with a top industrial team is the RIGHT station--I dare say the ONLY right station--for the tasks ahead. We know we and our international partners will be conducting a bewildering variety of exciting experiments, ranging in scope from microchemistry to macrophysics. We will be using the station as a shirt-sleeve laboratory in space allowing easy interaction the research with his equipment. We expect a flow of important exploratory discoveries and the development of technological insights directly applicable to our society's needs on the surface. But the larger reason for Station Freedom is reflected in its very name. The Space Station is our gateway to freedom, freedom to live away from earth, freedom to visit, to explore, to settle elsewhere in the solar system. Space Station Freedom will simultaneously teach us how to live and work and relax in a new environment and how to build the structures and habitats that will make human exploration a realistic as well as a spirit-lifting adventure. Whether we go sooner or later, whether we go directly or first to an extraterrestrial base on the moon, man will go to Mars and beyond. And the vehicles man will use will be the technological descendants of a space station.

Station Freedom is the first step toward being able to call ourselves a space-faring nation. Just as those earlier nations that conquered the ocean barriers to exploration and expansion became great in response to the challenge, so will latter-day nations that recognize the nature of today's response to challenge have the opportunity to flourish. The other half of the analogy holds as well: historical extinction awaits the cultures unwilling to risk the voyage, afraid to wet their feet.

It is a paradox, I feel, that this so simple point is so hard to make when we talk about the Space Station. The governmental process, both in the executive and legislative branches, discovered the notion of "options and alternatives" a few years ago, and now doesn't know how to stop asking the question, "Why not some other way?" Of course the motivation behind the questions is legitimate: are we embarked upon the right course for the right reasons aimed at the right goals? Restudy after restudy simply reinforces the conclusion that Station Freedom is well conceived and well managed but very sparingly financed. There is simply no room for further trimming or shaping or cutting. We either are going to build it-- and build it right--or not build it at all. And this binary consequence of under-budgeting and micro-management must be brought home to all who have an interest in the outcome.

The total budget for NASA the President has laid before the Congress and that the incoming President must evaluate has already been severely "edited"--some might say overly so--during its development. The level of assurance that we can deliver a first-class performance to America teeters in the balance with every constraint imposed, whether dollars or people or time or policy. I am more than usually concerned this year because the overall financial affairs of the country are not at their healthiest, and long-term investments are always an easier political target than are deliveries of current services. In the complicated debate that will range about the issues of deficit financing, debt management, trade imbalances, and our responsibilities to those in need, I worry that the small shining light of future hope fueled by the civil space program may be dimmed.

THE IMPLICATIONS OF IRRESOLUTION

In truth, the moment is coming when the nation chooses to lead--or to follow. I want to be as certain as I can that that choice is made knowingly and not by default. I cannot in good conscience return to private life without one last public service, trying to assure that the whole of American society be engaged in the decisions about its future strength, even its future survival. The thinly stretched space program before the country today cannot be taken as the banker for the Federal budget, or even for the smaller element termed "discretionary." Flesh and sinew are as taut as possible; even a nick can mean organic rupture and collapse.

We have always held that under a democracy the nation receives what it deserves. What I believe the nation deserves above all is a forthright understanding of the implications of those great decisions being made in the name of the republic. I believe the truth should be cast in as stark terms as possible, especially during a time when bad news is routinely disguised and even the most dedicated defenders of the public interest find it hard to find an audience.

Failure to meet the challenge would be a failure of political will. It would mean relinquishing for good the banner of leadership we have carried so proudly even during the darkest times of technical adversity. And the price of forfeiture is one paid by our children and their descendants. Without investment now there simply cannot be a future return; if we falter, if we are irresolute, if we cannot balance sacrifice with promise, then we have stolen the birthright of our successor generations.

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Among the great gifts of Rome's cultural genius were the organizing principles of an integrated transportation network, a universal language, and a system of valued citizenship under law. Scholars will argue endless about why the Roman imperial enterprise fell upon evil days; however, no one will seriously argue with Santayana's observation on who may be condemned to repeat an uncomfortable history. We have great virtues in our republic and I have great faith in the commom sense of its citizens. I have even greater faith in the power of great challenges--when so recognized--to elicit noble responses. That is where we as a nation stand in space today, and that is why I am so appreciative of the chance to address this audience.

I would leave you with one thought. Earlier I said that, sooner or later, mankind would reach the planets. I firmly believe that is true. But a terrible question remains unanswered: what language, what culture, what values will shape the ethos of the first human settlement on Mars? I do not know the answer, but I hope you and all who share with you a dedication to our cardinal national beliefs can help share an answer of which we and our heirs will be proud. There really can be no second-best place in the judgment of history.

- end -

NASA News

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For Release:
January 18, 1989

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RELEASE: 89-5

IMAGE PROCESSING TO RELIEVE VISION PROBLEMS

A new digital, visual-filtering technology, developed by a researcher at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., will offer new hope to sufferers from maculopathy or central spot blindness. Such people, mostly elderly, can no longer see fine detail or read, because of degeneration of key retinal cells in the eye.

The technology is based on digital image processing, originally developed at JPL to enhance the first pictures of Mars obtained by the Mariner 4 spacecraft in 1965. This technology is widely used today to enhance satellite data, photographs and other images in applications from space to medicine. It was adapted as a non-invasive method of relieving vision problems by Dr. Teri B. Lawton, a psychologist and mathematician researching fundamental visual functions in JPL's Robotics, Teleoperators, and Human Factors Research Group.

Dr. Lawton uses a small computer, interactively, to test an individual's vision loss and then, with customized image-processing software, to alter the spatial contrast and other properties of printed material so that the tested observer can read it more easily.

The optic nerve carries information from the retina, the sensitive screen in the back of the eye, to the brain. The connection of the optic nerve to the eyeball, a little offset from the center of the retina, is a small natural blind spot. Maculopathy, however, is a loss of response in or around the central part of the retina, in the fovea or macula, where retinal cone cells are clustered most thickly and where visual acuity is greatest. In this central region, we perceive fine details and sharp edges, for example, those defining letters on a page.

- more -

This disability affects a small fraction of 1 percent of young people, rising to afflict some 20 percent of those over 75. It is regarded as a leading cause or form of blindness in the U.S. and Europe, though it does not constitute total blindness.

Being essentially a degeneration of nerve cells rather than a problem of the lens or other parts of the eye, maculopathy does not respond to conventional treatment or corrective lenses. Powerful magnifiers, which may spread a few fuzzy letters over the whole field of vision, have given some relief.

The image-processing approach, now in early stages of development, uses closed-circuit TV equipment linked to a computer to present enhanced and moderately enlarged words and sentences onscreen to the reader. The computer-modified images appear blurred to an ordinary observer, but are more easily readable by the person for whom the enhancement formula was made.

Reading performance improvements resulting from this computer-enhancement method are shown in increased reading speed and reduced magnification required to see the words. In recent experiments, Dr. Lawton found that reading rates were improved 2-3 times, with 32-70 percent less magnification required for reading, compared to reading unenhanced words. A long development lies between the minicomputer-based prototype and a practical, portable reading machine, according to Dr. Lawton.

"The next step is a desk-top system, something like a microfilm or microfiche reader," says Dr. Lawton. "I would like to get some of these out to low-vision clinics for wider use and clinical evaluation." Books and magazines would be inserted and moved past the TV camera's lens for reading.

To carry out this next step, JPL has formed a collaboration with Visualtek, Inc. (VTEK), of Santa Monica, Calif. VTEK, formed in 1971 specifically to provide electronic vision aids to low-vision observers, has become a leading producer of reading aids based on closed-circuit TV and computer technology. VTEK will play an active part in optimizing the JPL technology for an effective, inexpensive commercial product, planned to enter the market by the end of 1991.

This application draws on the same developing body of knowledge that supports JPL's efforts to equip planetary roving vehicles with the ability to observe and identify obstacles, or orbital maintenance and repair systems to observe and manipulate hardware. This effort is sponsored by NASA's Office of Technology Utilization; the program manager is Ray L. Gilbert.

- end -

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For Release:

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January 18, 1989

Kari Fluegel
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RELEASE: 89-6

NASA CALLS FOR PROPOSALS REGARDING REUSABLE REENTRY SATELLITE

NASA officials at the Johnson Space Center (JSC), Houston, last week released a request for proposal (RFP) for continued studies and design of an unmanned reusable reentry satellite (RRS) that could significantly expand NASA's capability to investigate the weightlessness environment.

The RRS, called LifeSat when carrying life science payloads, will be placed into Earth orbit by an expendable launch vehicle, reserving the National Space Transportation System for activities requiring crew presence.

The RFP calls for the design of an almost completely reusable spacecraft that could be processed and readied for reflight in 2 months, allowing for several flights each year. Designs are expected to be derivatives of the often-flown Department of Defense Discovery satellite or the NASA Gemini/Apollo vehicles of the 1960s, calling for a vehicle roughly 6-feet in diameter and weighing more than 2,000 pounds with a useful payload of 500 pounds.

RRS will be used primarily in the fields of life sciences and materials processing and would fly experiments in a variety of orbits including those providing high doses of radiation for periods up to and perhaps, beyond 60 days. Upon completion of the flight, the RRS would reenter and soft-land at a designated ground-site where scientists and engineers would have immediate access to the experiments.

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Contracts for the design studies to begin this summer will be awarded to two vendors at a cost of $1 million each. The project will be managed by JSC and could be flown as early as 1993 if future development efforts are approved.

Five international agencies have expressed interest in participating in the RRS and are expected to conduct parallel study efforts to the U.S. activities. Agreements for the international coordination currently are being formulated.

The commercial community also has expressed interest in the RRS because of its unique orbits, flight duration, autonomous operations and the dedicated and easily scheduled nature of the system.

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January 19, 1989

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EDITORS NOTE:
NASA TO CONDUCT THIRD TEACHER VIDEO CONFERENCE IN SERIES

On Jan. 24, NASA's Educational Affairs Division, Office of External Relations, Washington, D.C., through Oklahoma State University, will conduct via satellite the third in a series of teacher video conferences discussing NASA's current and future projects. This conference, "Future Explorations," will address the development of a Mars outpost and a lunar base and will originate from NASA's Lewis Research Center (LeRC), Cleveland.

Alan Ladwig, director of special projects for the Office of Exploration at NASA Headquarters, will lead this program. Joseph Nainiger, deputy chief of systems analysis in the Office of Space Analysis at LeRC, will discuss future propulsion systems.

The live, 1-hour, interactive video conferences are designed to update teachers on NASA programs and to demonstrate aerospace activities and materials available to classroom teachers. The nation's participating schools will receive transmissions from 2:30 to 3:30 p.m. Eastern time.

NASA's education satellite, video-conference series, now in its third year, are seen by more than 20,000 educators in 50 states. One additional video conference in this series is scheduled:

Technology for Your Classroom - Mar. 21, 1989

The Jan. 24 conference will be transmitted on Westar IV, transponder 10D, channel 19. Media and organizations interested in the conference can access the satellite or view the event from NASA Headquarters, 400 Maryland Ave., S.W., room 6104.

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NASA News

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For Release:
January 19, 1989

RELEASE: 89-7

NASA COMPLETES FIRST X-29 FLIGHT RESEARCH, PREPARES FOR SECOND

Researchers and pilots at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., have completed flight tests on the first experimental forward-swept-wing X-29 aircraft and are planning high angle of attack flight tests, now scheduled for spring 1989, for the second X-29.

Investigations of the X-29's flight controls, flying qualities and its extensive use of composite materials have shown that the forward-swept-wing concept is practical and have added to the data base for the design of future aircraft.

"We have proven that the design is viable," says NASA X-29 Program Manager Gary Trippensee. "Our next step is to look at low-speed, high angle-of-attack characteristics of a forward-swept-wing aircraft using the second X-29."

During pitching maneuvers, angle of attack is the angle of the nose of an aircraft relative to its flight path. The ability to fly and maneuver at high angles of attack can provide great advantages to pilots of high-performance aircraft in situations requiring super maneuverability.

While aircraft-1 has been limited to 20 degrees angle of attack, aircraft-2 has been modified to permit safely flying at higher angles of attack. Researchers plan to increase angles by increments to a maximum of about 80 degrees.

Aircraft-2 has been equipped with a safety parachute for spin recovery and instrumentation has been modified to aid in high angle-of-attack measurements.

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During its two-phase, 4-year flight program, X-29 aircraft-1 flew a total of 242 flights, a record number for an X-series or experimental, high-performance aircraft.

Twenty pilots flew in the joint NASA/USAF program: seven from NASA, nine from the U.S. Air Force, one from the U.S. Navy, and three from Grumman Aerospace, the airplane's manufacturer. The last flight was flown by NASA test pilot Rogers Smith.

NASA project pilot is Stephen D. Ishmael, with Smith flying as co-project pilot. Air Force project pilot is Major Alan Hoover.

- end -

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RELEASE: 89-8

NASA SEEKS PROPOSALS FOR ORBITAL DEBRIS RADAR

NASA has requested proposals from industry for a ground-based radar that will quantify and characterize debris orbiting between 180 to 360 miles above Earth. The radar would have the capability of detecting debris as small as 1 centimeter in diameter, contrasted with the 10-centimeter capability of current radar systems.

The data gathered by the orbital debris radar are needed for designing the permanently manned Space Station Freedom. Even the smallest pieces of orbital debris pose a potential hazard to spacecraft, so it is important that the pressurized modules of Freedom be built to withstand as much orbital debris damage as possible. Space Station Freedom is planned to be in Earth orbit for up to 30 years.

Information is extremely limited about the number and size of small debris pieces at the operational altitude range of the space station. Preliminary experiments, using radar astronomy facilities, have suggested that the number of small debris particles at these altitudes may be higher than expected. The new radar will provide definitive information about such debris, determining its size, altitude and orbital inclination.

The orbital debris radar facility will conduct preliminary processing of data before sending it to NASA's Johnson Space Center, Houston, for further analysis and incorporation into models of the orbital debris environment.

Under the request for proposals (RFP) issued today, an offeror would design, construct and test an orbital debris radar and associated hardware and software. After a 5-month period of preliminary testing and operation at Goldstone, Calif., the offeror would be responsible for shipping the radar to an overseas location and then reestablishing and retesting the radar in preparation for operations at the overseas site.

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To meet Space Station Freedom design schedules, preliminary test results from the stateside location should be available by October 1991. The overseas station should be operational by March 1992.

The deadline for responses to the RFP is 7 weeks after its release. The firm, fixed-price contract will be managed by NASA's Jet Propulsion Laboratory, Pasadena, Calif.

- end -

NASA News

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For Release:
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RELEASE: 89-9

NASA SELECTS ATMOSPHERIC SOUNDER FOR EOS SPACE PLATFORM

NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., has established a new scientific instrument project office to develop and design a major new system for observing Earth's atmosphere. Scientists expect it to support a quantum leap in weather forecasting and in understanding our climate.

The instrument, called the Atmospheric Infrared Sounder (AIRS), was selected by NASA in late November 1988 to ride aboard the Earth Observing System (EOS) polar orbiting platform, as a facility instrument, beginning in the 1990s. This platform is an element of NASA's Space Station Freedom and proposed "Mission to Planet Earth" programs. EOS also is one of several Earth-orbiting scientific platforms planned by the U.S. and other nations.

The AIRS system will provide global, three-dimensional information on the temperature and composition distributions in the atmosphere (including humidity and clouds) as well as climate-related properties of the sea and land. It also will measure and help map ozone and various other "greenhouse" gases. AIRS will observe both day and night.

The instrument is designed to scan 45 degrees East and West from the North-South suborbital track aboard the EOS platform. It is being planned to operate 435 miles above the Earth in a 100-minute, circular orbit. AIRS will observe the atmosphere and surface in elements about 10 square miles and perceive the atmosphere in mile-thick vertical layers. It will be designed to read the temperature in each of these elements to an accuracy of approximately 1 degree Celsius (about 2 degrees Fahrenheit).

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The value of AIRS will be the continuous long-term record it compiles of climate change. "We can see and measure changes in global temperature over periods of one or more solar cycles," says Dr. Moustafa Chahine, JPL's chief scientist and an atmospheric physicist. "We will have records of trends in the greenhouse effect, both in the composition and movement of gases which cause it and in regional patterns of moisture and air circulation which may result from it. These are long-term changes, in contrast to weather patterns and are very subtle."

These measurements will be derived from infrared radiation data. The Earth emits electro-magnetic radiation which peaks in the infrared wavelength region. Some of this radiation is absorbed by gases in the atmosphere. The atmospheric gases themselves also radiate in the infrared. Determining wavelength bands the gases absorb and radiate and how intense the radiation is in the various bands will help determine such things as composition and temperature. AIRS will be able to make measurements in 256 spectral channels in the infrared spectrum (from 3 to 17 microns in wavelength). Accurate temperature mapping may require the use of 50 to 100 of these channels.

Data processing will be the key to AIRS. Scientists have been developing the algorithms (the complex of formulas used by scientists and their computers to turn the measurements into useful parameters) needed to process, use and understand AIRS data. These include computer models of the atmosphere which AIRS will help to refine as well as use in generating maps of the parameters retrieved after the use of the algorithms. It is anticipated that processing and interpreting the large constellation of AIRS measurements will call for large-scale computers in the "super" class, possibly parallel-processor designs.

AIRS is similar in some respects to the ATMOS experiment flown aboard a Shuttle flight in the spring of 1985 and planned for another Shuttle mission as part of the Atlas 1 mission. There are substantial differences in the two systems in their resolutions (how small an element of atmosphere each can pick out) and in the length of their observing periods. "ATMOS can observe the makeup of the upper atmosphere better than AIRS for a short period, but only AIRS can stay at its post observing changes year in and year out," says project manager Fred O'Callaghan, who is in charge of both efforts at JPL. "With refurbishments, we hope to get 15 years or more out of the AIRS instrument".

AIRS will be a "facility" instrument aboard the EOS platform. That is, it will function more like a laboratory or observatory than an instrument designed and operated by a single scientist or single team.

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A scientific committee to be selected by NASA will oversee its use and data records will be archived for later research as well as for immediate use.

The AIRS project is part of JPL's Office of Space Science and Instruments. The EOS scientific program is administered by Dr. Shelby Tilford of NASA's Office of Space Science and Applications, Washington, D.C. and the first orbiting platform will be managed by NASA's Goddard Space Flight Center, Greenbelt, Md.

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RELEASE: 89-10

NASA AND NIH APPOINT INTERAGENCY WORKING GROUP MEMBERS

NASA's Dr. Lennard Fisk, associate administrator of the Office of Space Science and Applications, Washington, D.C., and Dr. James Wyngaarden, Director of the National Institutes of Health (NIH), appointed a panel to explore a variety of cooperative and complementary programs in biomedical research.

Chairman of the group is Dr. Arnauld E. Nicogossian, M.D., NASA's director of the Life Sciences Division; co-chairman is Dr. Jay Moskowitz, associate director for Science Policy and Legislation, NIH. Other NASA members include: Dr. Ronald White, Dr. Frank Lemkey, Frank Sulzman, Carolyn Huntoon and Joseph Sharp. Other NIH members are: Dr. Claude Lenfant, Dr. Murray Goldstein, Dr. Lawrence Shulman and Dr. David Rall. The group also includes Dr. Lyle Bivens of the National Institute of Mental Health.

Joint programs in biomedical research, ground-based and space-flight, would investigate the biological changes in living organisms that occur or could occur during or after space flight. Potential applications of such research will be assessed.

Examples of cooperative programs to be discussed include:

o The identification and possible development of complementary ground-based research programs in selected areas of biomedical research related to space flight;

o The concurrent funding and management of focused university-based programs through program project awards;

o The funding and management of career development awards in specific areas of biomedical research relevant to space flight;

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- The development of an interagency approval process to facilitate the space flight of NIH-sponsored research projects in the space station era;

- The funding and management of graduate and postdoctoral fellowship awards in selected areas of biomedical research that require use of unique NASA or NIH facilities;

- The formation of NASA or NIH study sections or disciplinary advisory panels to conduct peer reviews of proposals in selected areas of biomedical research related to the interests of NASA and NIH;

- The development of simplified administrative procedures to allow sharing of unique research facilities between NIH and NASA research teams.

The interagency working group is established under a memorandum of understanding between the two agencies, signed in mid-1988. The agreement is intended to enhance the biomedical research capabilities of both agencies.

Working group meetings will be held regularly. The first meeting is scheduled for Feb. 15, 1989.

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NASA ANNOUNCES PROGRAM FOR A DRUG-FREE WORKPLACE

NASA Administrator Dr. James C. Fletcher announced today that in support of an executive order calling for a "Drug-Free Federal Workplace," the agency will implement a broad-based program.

Fletcher stressed that the NASA program considers "the unique nature of its work force and the limited scope of drug abuse in the agency." Consequently, the program strongly emphasizes education, training and assistance through the NASA Employee Assistance Program (EAP), coupled with a limited degree of drug testing, as the most effective means of ensuring a continuing drug-free workplace.

"NASA recognizes that drug abuse is debilitating and that prolonged illegal drug use makes it progressively more difficult for the individual to refrain from such drug use. NASA will continue to extend a helping hand to any employee who may be experiencing a problem related to such drug use by encouraging the employee to take advantage of the existing services provided by the NASA EAP," Fletcher said in a letter to all NASA employees.

Fletcher said that employees who occupy "sensitive" positions, as defined in the NASA program and determined by NASA management, will be subject to random drug testing. Included among the agency's sensitive positions are: all senior level management personnel, including the administrator and his deputy, as well as all center directors; flight-related personnel such as astronauts, pilots, mission and payload specialists, flight controllers, test directors and other scientific and engineering personnel involved in the actual planning and managing of manned and unmanned flight related activities; research personnel such as scientists, engineers, technicians and mechanics; and safety-related personnel such as criminal investigators, firefighters and quality assurance specialists.

He also said that, while drug testing may be required if there is a reasonable suspicion of illegal drug use or an accident or unsafe practice, all drug testing will be conducted in accordance with the mandatory guidelines for federal workplace drug testing programs issued by the Department of Health and Human Services.

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EDITORS NOTE: NASA WORKSHOP TO EXAMINE MARS MISSION TECHNOLOGY

NASA studies of future solar system exploration include options for both piloted and robotic missions to Mars. One challenge to future Mars exploration is to use the martian and Earth's atmospheres to slow the vehicles while protecting them from the searing temperatures encountered during atmospheric entry. This slowing process is now achieved in part through the use of rocket engine firings.

NASA is investigating a new technology called high-energy aerobraking which would allow spacecraft to be slowed on atmospheric entry without having to use rocket engines. The new technology would use an aerobrake -- a structure whose large blunt shape would slow the vehicle through friction with the atmosphere.

Currently, interplanetary spacecraft necessarily carry the weight of the rockets and their propellants throughout its entire mission. The use of high-energy aerobraking would permit the weight and space, now dedicated to rockets and propellants, to be used by astronauts or for additional science payloads. Aerobraking also could be used on returning from lunar missions.

Scientists and engineers from NASA, private industry and universities will meet at NASA's Ames Research Center, Mountain View, Calif., Jan. 31 through Feb. 2, for a workshop on high-energy aerobraking. The workshop will highlight current and planned aerobraking research efforts. Limited aerobraking experience exists upon which to base these future designs.

Media representatives are invited to attend the workshop to be held in the Main Auditorium, Building 201. NASA officials will be available to answer questions.

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LAUNCH ADVISORY: STS-29 ROLLOUT, CHANGEOUT OF HPOTPs ON SSMEs

NASA has decided to roll Discovery to the launch pad in preparation for STS-29; this activity currently is targeted for Friday morning, Feb. 3. In addition, NASA will proceed with a plan to changeout all three high pressure oxidizer turbopumps (HPOTP) in Discovery's main engines, leading to a launch in mid-March. A launch date will be set at the flight readiness review. Preparations will begin to remove the first HPOTP as early as Sunday, Feb. 5. A press briefing is planned for Monday, Feb. 6, to discuss various program decisions. Details of the briefing will be announced later.

- end -

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

February 1, 1989

RELEASE: 89-12

BALLHAUS RETURNS TO AMES RESEARCH CENTER

Dr. William F. Ballhaus, Jr., will return to NASA's Ames Research Center, Mountain View, Calif., and resume his position as center director, effective Feb. 1. Ballhaus had accepted a one-year assignment as acting associate administrator for aeronautics and space technology, NASA Headquarters, which began Feb. 1, 1988. He will continue to serve in this position until a replacement is named.

For the past year, Ballhaus has directed NASA's aeronautics and space research and technology development programs and was responsible for the institutional management of NASA's Ames, Langley and Lewis research centers.

In announcing the reassignment, Dr. James C. Fletcher, NASA administrator, said, "Bill Ballhaus responded to a call to come to NASA Headquarters for a year during a critical period in the agency's history. I express my sincere appreciation to him and his family for what he has contributed toward getting the nation's space program back on track."

Ballhaus served as director of Ames since January 1984. Prior to directing Ames, he served as the center's director of astronautics and as chief of the Applied Computational Aerodynamics Branch. He came to NASA in 1971 when he joined the U.S. Army Aeromechanics Laboratory and was assigned to the Computational Fluid Dynamics Branch at Ames.

Dr. Dale L. Compton, Ames deputy director, has served as acting director of the center during Ballhaus' absence.

-end-

National Aeronautics and
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For Release:

Charles Redmond
Headquarters, Washington, D.C.
(Phone: 202/453-1549)

February 6, 1989

Keith Henry
Langley Research Center, Hampton, Va.
(Phone: 804/864-6121)

RELEASE: 89-14

EFFECTS OF CLOUDS ON CLIMATE MEASURED BY NASA PROJECT

The most accurate Earth radiation budget measurements ever made, provided by NASA's Earth Radiation Budget Experiment (ERBE) satellite, confirm that clouds result in a net cooling of the Earth. Previously, atmospheric scientists were divided on the impact of clouds on the Earth's temperature.

These measurements serve as the baseline for climate modelers to determine whether clouds will partially offset or enhance a future warming of the Earth due to the greenhouse effect. The greenhouse effect is the term given to warming of the Earth's atmosphere and surface resulting from increased concentrations of gases, such as carbon dioxide, methane, nitrous oxide and chlorofluorocarbons.

The major uncertainty in the current ability to assess the future impact of greenhouse gases is the effect of clouds. ERBE has given climate modelers some very specific numbers to test and validate their models.

At any given time, clouds cover about 60 percent of the Earth. Wispy, high-altitude cirrus (ice) clouds generally tend to warm the surface. They reflect less solar energy back to space than stratus and cumulus (liquid water) clouds.

Because they are so high in the atmosphere, ice clouds are more efficient at trapping the infrared heat energy emitted by the Earth and the atmosphere. Low-level water clouds not only shade the Earth's surface from the Sun's rays better than high-altitude ice clouds, they emit almost as much infrared radiation as a cloud-free Earth. The net effect of clouds on surface temperatures depends on how these different cloud types are distributed over the globe.

-more-

The first of the three ERBE satellites was launched by the Space Shuttle Challenger in October 1984. National Oceanic and Atmospheric Administration (NOAA) weather satellites NOAA-9 and NOAA-10 launched in December 1984 and September 1986, respectively, also carried the ERBE instruments. ERBE provided the first opportunity to measure the three components of the Earth's radiation balance with identical instruments flying simultaneously on separate satellites.

ERBE's instruments measured the solar radiation striking the Earth and the solar radiation reflected by the Earth. These two measurements determine how much solar energy is absorbed by the Earth. The absorbed solar radiation heats the Earth's surface. The infrared radiation emitted by the Earth and its atmosphere also is measured. This emitted radiation cools the surface of the Earth.

The ERBE measurements indicate that in April 1985, clouds reflected back to space considerably more radiation than they trapped in the atmosphere and the surface. This loss of radiation due to the clouds is approximately equivalent to a 10 to 30 degrees F. decrease in the global surface temperature. Thus, barring changes in any other variables, the Earth would be about 20 degeees F. warmer without any cloud cover. In comparison, climate modelers believe that a doubling of carbon dioxide in the atmosphere would result in a warming of about 4 to 8 degrees F.

Global warming would change circulation patterns, altering the climates and growing seasons of many regions over the globe. Significant warming also would melt large amounts of ice and snow in the polar regions, increasing the height of the world's oceans. Changes in global circulation patterns would also change the distribution of clouds over the globe. The ERBE data also revealed for the first time the regional distribution of cloud effects over the globe.

Langley scientists Patrick Minnis and Edwin F. Harrison published the first paper in 1984 showing the regional cloud effects over part of the Earth. They used data from a weather satellite which only observed North and South America. The ERBE satellites viewed all of the Earth with sensors much more accurate than those normally carried on weather satellites.

ERBE is the first step in NASA's long-term program for studying climate change and is both a national and international effort supported by other government agencies and universities.

- more -

The ERBE satellite instruments were developed at Langley and the TRW Corporation, Redondo Beach, Calif. Langley is responsible for data analysis. ERBS was developed at NASA's Goddard Space Flight Center, Greenbelt, Md., and Ball Aerospace, Boulder, Colo. NOAA supplied the two weather satellites.

(Editor's note: A videotape of ERBE measurements can be obtained from NASA's Broadcast and Audio Visual Section, Headquarters, Washington, D.C., 202/453-8594)

This release and other NASA information is available electronically through DIALCOM, INC. For access to NASA NEWS through this system, contact the NASA NEWS representative, DIALCOM, INC., at 202/488-0550.

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NASA

National Aeronautics and
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For Release:

Charles Redmond
NASA Headquarters, Washington, D.C.
(Phone: 202/453-1548)

February 8, 1989

Randee Exler
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-7277)

James Wilson
Jet Propulsion Laboratory, Pasadena, Calif.
(Phone: 818/354-5011)

RELEASE: 89-15

NASA ANNOUNCES EARTH OBSERVATION SYSTEM INVESTIGATIONS

NASA officials today announced the selection of scientific investigations for the Earth Observing System (EOS) program, a multi-mission observation system of the 1990's to study global changes taking place in planet Earth's environment.

EOS is a science mission with the goal to advance understanding of the entire Earth system on the global scale through development of a deeper understanding of the components of that system, the interactions among those components and how the Earth system is changing.

The EOS mission will create an integrated scientific observing system enabling a multi-disciplinary study of planet Earth, including its atmosphere, oceans, land surfaces and the solid Earth. To quantify changes in Earth's system, EOS will be a long-term mission providing systematic, continuing observations from low-Earth orbit.

EOS will make use of a new generation of spacecraft, called polar platforms, being developed as part of the U.S. Space Station Freedom program. The program is a cooperative effort that may eventually include five platforms -- two from the United States, two from Europe and one from Japan -- as well as use data from future National Oceanic And Atmospheric Administration operational satellites in polar orbits.

- more -

Crucial to achievement of the mission's objectives will be development of the EOS data and information system that will provide access to data acquired by EOS instruments and to scientific results of research using these data.

Announcement of Opportunity

Investigation selections were based on proposals submitted in response to a January 1988 NASA announcement of opportunity. Proposals were solicited for scientific investigations which involve the provision of data from Earth observing instruments and use of data from instruments to be flown in polar orbit on one of the EOS platforms.

Three types of proposals were solicited: instrument investigations to include the provision of instrumentation for flight on the polar platforms including non-Earth science payloads which require flight in polar orbit; research facility instrument team member and team leader investigations for the six NASA research facility instruments to be flown on the various platforms; and interdisciplinary investigations to provide data analysis and modeling, preparing for and using EOS.

NASA received 455 proposals in response to the announcement. Each proposal was evaluated by scientific peers including representatives from government, academia, industry and the international Earth-observation community. NASA then selected, from the ones viewed as acceptable by peer evaluators, those proposals needed to accomplish the EOS objectives.

The selection breakdown includes 24 instrument investigations, 6 research facility instrument investigation team leaders and 87 team members, and 28 interdisciplinary investigators (20 U.S. and 8 foreign). The various teams selected comprise 551 individuals from 168 institutions, universities or laboratories in 32 states and, including the U.S., 13 countries.

Instrument Investigations and Descriptions

Selected instrument investigations will provide scientific instruments for flight on the polar platforms and analysis of the resulting data. Investigations will provide new observations to improve understanding of the Earth system or in some cases, of space physics phenomena.

Research facility instrument team members and leaders for the six NASA research facility instruments were selected. Each of the instruments are planned to fly on one of the polar platforms.

- more -

Those selected propose to carry out a scientific investigation with data from the research facility instrument leading to an improved understanding of some aspect of the Earth system and to help NASA develop these instruments and analyze their data. These instruments include:

- Atmospheric Infrared Sounder (AIRS)

AIRS will measure atmospheric temperature, moisture and other properties as a function of height above the ground with an accuracy and resolution far surpassing current operational satellite instruments.

- Geodynamics Laser Ranging System (GLRS)

GLRS is a system to study Earth's crustal movements in earthquake-prone regions and across tectonic plate boundaries by precisely determining the locations of special mirrors set up on the ground. GLRS also can measure the surface height profile of glaciers and polar ice sheets to determine how fast they are growing or shrinking.

- High Resolution Imaging Spectrometer (HIRIS)

HIRIS is an imaging spectrometer providing highly programmable, localized measurements of geological, biological and physical processes.

- Laser Atmospheric Wind Sounder (LAWS)

LAWS is a laser detection and ranging system for direct measurement of tropospheric wind velocities by observing the Doppler shift in light reflected from wind born dust.

- Moderate Resolution Imaging Spectrometer (MODIS)

MODIS is an imaging spectrometer to measure biological and physical processes in the study of terrestrial, oceanic and atmospheric phenomena.

- Synthetic Aperture Radar (SAR)

SAR is an imaging radar which can see through clouds to observe properties relating to the geology, hydrology and ecology of the land, sea ice and ocean waves.

Interdisciplinary Investigations

The selected interdisciplinary investigations include analysis, interpretation and significant use of data from EOS.

The proposals involve research in more than one of the traditional disciplines of Earth science and use data from more than one of the EOS instruments. Several of these investigations will develop and improve numerical models that will form the basis of a new predictive capability to forecast the global environment.

The EOS scientific program is administered by NASA's Office of Space Science and Applications, Washington, D.C. NASA's Goddard Space Flight Center (GSFC), Greenbelt, Md., is responsible for the first orbiting polar platform. NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., will manage the second orbiting polar platform.

Dr. Dixon Butler is the EOS program scientist, and Alexander Tuyahov is EOS program manager, both at NASA Headquarters. Dr. Gerald Soffen is the EOS project scientist, and Charles MacKenzie is the EOS project manager, both at GSFC. Dr. Jobea Cimino is acting EOS project scientist, and Michael Sander is the EOS project manager, both at JPL.

- end -

(Editors Note: A listing of investigations and investigators is available at the NASA Headquarters newsroom, Washington, D.C. (Phone: 202/453-8400).

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

Dwayne C. Brown
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

For Release:
February 10, 1989

N89-15

NOTE TO EDITORS: NASA SCHEDULES THREE MEDIA BRIEFINGS

NASA will hold media briefings on Feb. 14, 16, 17. All briefings will be carried on NASA Select television, Satcom F2R, transponder 13, 72 degrees west longitude, frequency 3960.0 MHz, audio 6.8 Mhz. The briefing schedule follows:

GALILEO PROBE AND PRE-SHIPMENT PREVIEW

The Galileo probe, which will make the first entry into the atmosphere of an outer planet, will be the subject of a briefing and review of spacecraft hardware on Tues., Feb. 14, 3:30 p.m. EST, on a taped-delayed basis. Participants will include NASA managers and engineers of the probe and Hughes Aircraft Company (builder of the probe) executives discussing the probe and its mission.

Media, who wish to attend the live briefing at 10:00 a.m. PST, and obtain materials from the briefing, should contact NASA's Ames Research Center, Mountain View, Calif., 415/694-5091.

JOINT U.S./USSR BIOSCIENCE RESULTS; FUTURE COLLABORATIVE MISSIONS

NASA's Ames Research Center, Mountain View, Calif., will be the site of a briefing Thurs., Feb. 16, at 1:00 p.m. EST, summarizing scientific results from the U.S. cooperative experiments on the Soviet Cosmos 1887 biosatellite mission.

NASA Ames' Rodney W. Ballard, Ph.D., Cosmos project scientist and assistant chief of the Space Life Sciences Payloads Office, will conduct the briefing. Eugene Ilyin, M.D., director of Cosmos Biosatellite Program for the Institute of Biomedical Problems, Ministry of Health, Moscow, will be the Soviet spokesman.

-more-

Richard E. Grindeland, Ph.D., Cosmos 1887 biospeciman program manager will summarize U.S. science results.

The joint activites are being conducted under the 1987 U.S.-USSR Agreement concerning Cooperation in the Exploration and Use of Space for Peaceful Purposes.

Video clips, additional news releases and two-way question and answer capability will be available.

NASA AND NOAA ARCTIC OZONE BRIEFING

NASA and the National Oceanic and Atmospheric Administration (NOAA) will hold a briefing at the National Press Club, 529 14th Street, N.W., Washington, D.C., in the Peter Lisagor Room, at 9:00 a.m. EST, Friday, Feb. 17. The briefers will announce results of the Airborne Arctic Stratospheric expedition, a cooperative investigation into the nature of potential depletion of ozone in the Arctic region.

Participants will be Dr. Robert Watson, NASA program scientist and Dr. Adrian Tuck, NOAA project scientist.

The briefing will have two-way question and answer capability and will be broadcast simultaneously in London and Oslo, Norway.

NOTE TO MEDIA: A video release, including "B" roll, will be played during the ozone briefing for media with video recorders to tape the documented material recorded in Norway. A limited number of 3/4-inch cassettes will be available for media who cannot record for themselves. For additional information, call the Broadcast and Audio Visual Branch at 202/453-8594. B&W and color transparencies of the expedition also will be available. Call 202/453-8375 or write to:

Broadcast and Audio Visual Branch
LMD/NASA Headquarters
Washington, D.C. 20546

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

February 10, 1989

RELEASE: 89-16

US/UK ASTOVL PARTNERS ANNOUNCE AIRCRAFT TECHNOLOGY STUDY RESULTS

NASA, in cooperation with DOD and government officials of the United Kingdom, has completed a set of concept evaluation studies of advanced short take-off and vertical landing (ASTOVL) fighter aircraft concepts.

The aim of the ASTOVL studies was to assess the overall propulsive-lift/airframe system performances and to identify the criticality of various technologies needed to attain these performances. NASA's Lewis Research Center, Cleveland, led the propulsion system study efforts and NASA's Ames Research Center, Mountain View, Calif., led the airframe and integration efforts.

Cecil C. Rosen, NASA's Director for Aeronautics, was the NASA representative to the four-member Executive Steering Committee.

A summary announcement issued by this committee on the results of the ASTOVL Study Program is attached to this release.

-end-

NASA, DOD, AND UNITED KINGDOM ASTOVL AIRCRAFT STUDY RESULTS

The U.S./U.K. Program on Advanced Short Take-Off and Vertical Landing (ASTOVL) has reached an important stage. The Executive Steering Committee has reviewed the results of the international Concept Evaluation Studies and has determined the overall direction for the future U.S./U.K. ASTOVL Technology Development Program. This collaborative program is based upon an memoraandum of understanding signed in January 1986 between the governments of the United States and the United Kingdom concerning cooperation on research in relation to future ASTOVL combat aircraft.

Concept evaluation studies, under the direction of an international joint working group, have been completed by airframe and engine companies of both countries, resulting in two sets of studies of each of four concepts:

Advanced Vectored Thrust (AVT)

Remote Augmented Lift System (RALS)

Ejector Augmentor (EA)

Hybrid Tandem Fan (HTF)

During the course of the studies, it became apparent that one AVT variant - the Mixed Flow Vectored Thrust (MFVT) was sufficiently different to merit treatment as a separate concept. The UK studies were all conducted by British Aerospace and Rolls-Royce. The US studies were conducted by McDonnell-Douglas in association with Pratt & Whitney, Grumman with General Electric, General Dynamics with General Electric, and Lockheed with Pratt & Whitney/Rolls-Royce, Inc.

The results of these studies by industry were then examined by a joint assessment and ranking team composed of officials drawn from the two countries. The establishment of this joint, co-located team using criteria established before starting the assessment, has resulted in a particularly successful collaboration.

The overall results of the above activities indicate that the most promising ASTOVL configurations are those which utilize remote lift for jet-borne flight (decoupling the location of the engine from the placement of the jet thrust nozzles) and conventional mixed flow propulsive systems for wingborne flight. Officials of the two nations have agreed that these concepts will receive the greatest attention in the technology development program to facilitate possible future development of ASTOVL combat aircraft.

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National Aeronautics and
Space Administration

Washington, D.C. 20546
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For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

February 14, 1989

Donald G. James
Ames Research Center, Mountain View, Calif.
(Phone: 415/694-5091)

RELEASE: 89-17

TRUCK AERODYNAMIC DEVICE COULD LEAD TO MAJOR FUEL SAVINGS

Major improvements in the fuel economy of U.S. tractor-trailer trucks could result from a new device, called an aerodynamic boat-tail, recently tested in a wind tunnel at NASA's Ames Research Center, Mountain View, Calif.

Estimates based on U.S. Department of Transportation data for fuel consumption by tractor-trailer trucks indicate the savings could reach nearly 1 billion gallons of fuel per year if the device were widely used by the U.S. trucking industry.

The aerodynamic boat-tail consists of plate extensions attached to the rear of the trailer. "The testing showed that the boat-tail plates decreased air drag by about 10 percent on a current, aerodynamically clean, tractor trailer," said Dr.Jim Ross, Ames project director.

The simplicity of the device means that it can be readily retrofitted to existing trailers and will not severely interfere with the operations of the rear door.

The test team, lead by Ames Aerospace Engineer Wendy Lanser, studied 30 configurations. The drag reduction was determined by comparing three different measurements made both with and without the boat-tail plates. All of the drag reduction measurements agreed to within 10 pounds.

Drag reduction is achieved by causing the air flowing over the trailer's top and sides to turn inward as the air separates at the trailer's back. The plates cause the air to behave as if there was a tapered faring, or "boat-tail," on the back of the trailer.

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The air flow is turned in a region where the flow is trapped by the plates. By turning the flow, pressure on the back of the truck is increased and the drag is reduced.

The unsteady nature of the wake behind a large truck is apparent whenever a car drives too closely behind a truck. The unsteady wake shows up as buffeting of the car and as swirling dust patterns at the road side. In the wind tunnel, the wake was made visible by emitting smoke from the truck's back door and illuminating the wake with a laser light. This technique clearly showed the unsteady wake vortex shedding from the back end of the trailer. In addition, the air turning effect of the boat-tail plates was readily apparent.

Preliminary computational fluid dynamic test results showed the wake to behave in a manner consistent with the wind tunnel experimental observations. Numerically computed velocity contours for a truck-like body clearly showed the structure of the wake. The non-symmetric nature of the contours illustrates the unsteadiness of the wake flow. The computations were performed by Dr. Ross using the program INS3D written by Dr. Dochan Kwak of NASA Ames. Work is continuing to improve the predictive capabilities of present simulation programs including the effects of turbulence.

The tests were conducted from Oct. 17 to Nov. 16, 1988, under a National Science Foundation (NSF) Small Business Innovative Research (SBIR) Award to Continuum Dynamics, Princeton, N.J. Dr. Alan Bilanin was the principal investigator for Continuum Dynamics.

Continuum Dynamics, a small research and development firm, received the NSF grant in 1985 based on a proposal to reduce the aerodynamic drag of tractor trailers. The grant was made possible by the federal SBIR program which, in 1987, awarded $350 million in research and development funding to small businesses.

The tractor and trailer used in the test were loaned to Continuum Dynamics by Navistar International Transportation Corp. and Fruehauf Corp., respectively. The tractor was one of the new, highly aerodynamic, International CO9700 cab-over models. Fruehauf previously has developed experimental tractor-trailer aerodynamic systems.

Testing at NASA's Dryden Flight Research Facility in the early 1980's showed significant drag reduction on ground transportation vehicles using boat-tail devices, rounded corners and enclosed underbodies. Tests in the mid-70's showed the effectiveness of adding flow-directing devices above the cab to reduce drag, a feature widely adopted by U.S. truckers.

Though NASA's wind tunnels generally are used for aerospace research, wind tunnel testing was the only way to get valid data on the new device. Road tests provided limited information because of noise and vibration interference.

In addition to demonstrating a technology for saving fuel, the test results are providing researchers with valuable data to verify computer codes used to analyze and illustrate the complex aerodynamics of airflow around a configuration such as the truck. Ames Research Center is NASA's lead center for computational fluid dynamics. Ames also uses the world's fastest supercomputers to simulate airflow around aerodynamic configurations.

-end-

Photographs are available to illustrate this release by calling 202/453-8375.

Color:	B&W:
	89-H-31
89-HC-47	89-H-32
	89-H-33

NASA Facts

National Aeronautics and
Space Administration

Washington, D.C.
20546

February 16, 1989

NASA AND THE USSR IN THE COSMOS BIOSATELLITE PROGRAM

NASA has a long history of cooperation with the Soviets in space biology and medicine, dating from the 1971 U.S./USSR Space Agreement. Under this agreement, a joint working group on space biology and medicine was established between the USSR Academy of Sciences and NASA.

At the fifth Joint Working Group meeting on Nov. 4, 1974, held in Tashkent, USSR, the Soviets invited the U.S. to perform joint experiments on a USSR biosatellite. Between 1975 and 1985, the U.S. participated in five Cosmos biosatellite missions on Cosmos 782, 936, 1129, 1514 and 1667. The twelfth and last Joint Working Group met September 1980 in Washington, D.C.

Under the 1971 agreement, NASA's Ames Research Center, Mountain View, Calif., has had lead responsibility for implementing U.S. participation in Soviet Cosmos missions.

A new agreement concerning the Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes was signed in April 1987 by U.S. Secretary of State George Shultz and Soviet Foreign Minister Eduard Shevardnadze establishing the U.S./USSR Joint Working Group on Space Biology and Medicine. The first meeting was held in Moscow and Nal'chik, USSR, in August 1987; the second working group meeting was held in Washington, D.C., in September 1988.

The U.S. participated with Soviets in the most recent Cosmos biosatellite mission, which was launched in September 1987. Known as Cosmos 1887, U.S. participation included 26 major life sciences experiments, with a total of over 50 scientists from Ames and universities throughout the U.S.

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In the recent collaborative Cosmos 1887 mission, a team of eight American scientists and engineers traveled to the USSR in early October 1987 for the Cosmos spacecraft return.

The team was headed by James P. Connolly, Cosmos project manager, and Drs. Rodney Ballard and Richard Grindeland, project scientists at Ames. The Cosmos 1887 experiments were conducted by more than 50 U.S. principal investigators and co-investigators both confirming and expanding observations and findings of the U.S. Spacelab mission flown in 1985 and earlier U.S. and USSR life sciences missions.

In addition to the biomedical experiments on Cosmos 1887, the U.S. placed eight radiation detector packages inside and outside the biosatellite spacecraft to measure radiation. These measurements determined the radiation dosages in space that could be harmful to astronauts in orbit.

The USSR has invited the U.S. to participate in the next two Cosmos missions planned for early summer 1989 and 1991.

U.S./COSMOS 1887 MISSION QUICK LOOK FACTS

DISCIPLINE AREAS

Calcium metabolism, immunology, muscle and bone biochemistry and histology.

PRELIMINARY SCIENTIFIC RESULTS

A 50 percent reduction in bone marrow immunogenic cells was observed postflight.

Growth hormone production by pituitary cells was reduced by 50 percent postflight.

A marked atrophy of leg muscle (50 percent) was observed postflight.

A marked weakening of the humerus (foreleg) was observed postflight.

-end-

NASA News

National Aeronautics and
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For Release:

Jeff Vincent
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

February 16, 1989
4:00 p.m. EST

Randee Exler
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-7277)

CONTRACT: 89-D

RAYTHEON SELECTED FOR LOGISTICS DEPOT SUPPORT SERVICES AT GODDARD

NASA's Goddard Space Flight Center (GSFC), Greenbelt, Md., has selected the Raytheon Service Co., Burlington, Mass., for negotiations leading to the award of a cost-plus-award-fee contract for logistics depot support services.

The contract, expected to be effective on April 1, 1989, will consist of a 3-year basic contract through March 31, 1992, and a 2-year option through March 31, 1994.

The cost as proposed by Raytheon, excluding fee, is $85,302,882 for the basic 3-year period and $61,576,763 for the 2-year option period.

The contract will provide for logistics support for GSFC tracking and data operations, as well as support to the engineering activities associated with the tracking and data operations. It also will support the Mission Operations and Data Systems Directorate at Greenbelt.

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Paula Cleggett
Headquarters, Washington, D.C.
(Phone: 202/453-1547)

February 16, 1989

C. J. Fenrick
Ames Research Center, Mountain View, Calif.
(Phone: 415/694-5091)

RELEASE: 89-18

COSMOS MISSION RESULTS AND FUTURE U.S./USSR MISSIONS ANNOUNCED

The science results of the collaborative U.S./USSR biosatellite mission from Cosmos 1887 have confirmed the adverse physiological and biomedical effects of prolonged space flight.

The analyzed mammalian biospecimens suggest that adolescent vertebrate animals will experience significant alterations in calcium metabolism, immune functions and musculoskeletal mass and structure.

The Soviet Union launched Cosmos 1887 on Sept. 29, 1987, for a 12-plus-day mission. Cosmos 1887 was the sixth in a series of unmanned Soviet satellites that flew U.S. and USSR life sciences experiments. This cooperative activity is being carried out under the 1987 U.S./USSR agreement concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes.

The U.S. experiments on Cosmos 1887 investigated the effects of space flight on the major body systems, including skeletal bones and muscles, nervous system, heart, liver and several glands and blood. Special tissue culture studies, using pituitary cells, studied the growth hormone. Spleen and bone marrow cells were used to investigate the effects of microgravity on the immune system. The U.S. also had a radiation measurement experiment on the spacecraft.

The Soviet experiments were developed and managed by the Institute for Biomedical Problems, Moscow. The USSR provided the U.S. tissue samples from 5 of 10 rats that were flown aboard the spacecraft.

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The majority of the scientific specimens were returned to the U.S. in late October 1987 and distributed to scientific teams around the country. The remainder of the biosamples arrived at NASA's Ames Research Center, Mountian View, Calif., for analysis in early November.

The science results of Cosmos 1887 bone studies indicated structural changes occurred without significant changes in the mineral content. For example, the bending strength of the rat humerus bone was decreased by 40 percent and the compression strength of the lumbar vertebra was decreased by 27 percent.

Muscle studies on the rats showed that, while individual muscle weights were similar for both flight and ground control animal groups, the fast muscle types showed significant decrease in cross-sectional area, atrophy and extracellular edema, while at the same time showing increased necrotic fibers and motor end plate degradation. Slow muscle types showed little evidence of atrophy but some biochemical changes. The mitochondria in the heart muscle also showed degeneration and fiber changes.

Observations on other body organs and physiological systems confirmed what was learned on previous flight research experiments, such as a decreased mass and spermatogenesis in the testes, decreased growth hormone release by the anterior pituitary cells, increased cholesterol, triglycerides and organ weight in the liver and a reduced immune response suggested by several types of measures involving the spleen, bone marrow and blood.

The U.S. Space Biology and Medicine Program has received many benefits from scientific cooperation with the USSR, including the opportunity to conduct experiments on the physiological effects of 12-plus-days of space flight on rats and rhesus monkeys. This length of the Cosmos missions is approximately twice the exposure time in microgravity that is presently experienced in U.S. Spacelab flights on the Shuttle.

While a comparable 8-day U.S. mission with rats is expected to fly in mid-1990, a U.S. mission with rhesus monkeys is not expected until late 1992 or 1993. These early Cosmos flights serve as a testbed for the development of U.S. scientific experiments, technology and flight hardware. In addition, both sides benefit from the sharing of research data in all areas of space biology and medicine.

The U.S. has three opportunities to fly experiments with the Soviets in the next few years. The USSR has invited the U.S. to participate on the USSR 1989 and 1991 biosatellite missions.

-more-

The science focus will be in biomedical research with the following payload specimens: Rhesus monkeys, male wistar rats, fish, fish eggs, newts, drosophila, beetles, seeds, unicellular organism and planaria.

In reciprocal fashion, Soviet scientists have been invited to participate in analysis of specimens from the U.S. Shuttle Spacelab life sciences mission to be launched in June 1990.

-end-

New
3pm
2/17

Friday, February 17, 1989

National Aeronautics and Space Administration
Initial Small Business Innovation Research (SBIR) Proposals
Selected for Negotiation of SBIR 87-1 Phase II Contracts (Set B)

CALIFORNIA

SPACE COMPUTER CORP 2800 OLYMPIC BLVD #104 SANTA MONICA, CA 90404-4119	03.06-8740 (ARC) PASSIVE ELECTRO-OPTICAL SENSOR PROCESSING FOR HELICOPTER OBSTACLE AVOIDANCE
ENGINEERING MECHANICS ASSOC 3820 DEL AMO BLVD SUITE 318 TORRANCE, CA 90503	04.10-2551 (JPL) METHODS FOR EVALUATING THE PREDICTIVE ACCURACY OF STRUCTURAL DYNAMIC MODELS
EIDETICS INTERNATIONAL INC 3415 LOMITA BLVD TORRANCE, CA 90505	03.06-8228 (ARC) A GRAVITY INDUCED LOSS OF CONSCIOUSNESS DETECTION AND RECOVERY SYSTEM
METRIWAVE INC 77 N OAK KNOLL AVE #114 PASADENA, CA 91101	08.18-0669 (JPL) MICROWAVE NETWORK ANALYZER FOR SIS MIXER RESEARCH
IRVINE SENSORS CORP 3001 REDHILL AVE BLDG 3 #208 COSTA MESA, CA 92626	08.01-8211 (JPL) HYMOSS SIGNAL PROCESSING FOR PUSHBROOM SPECTRAL IMAGING
ODETICS INC 1515 SOUTH MANCHESTER AVENUE ANAHEIM, CA 92802-2907	05.01-0300A (JPL) CONTROL ALGORITHM IMPLEMENTATION FOR A REDUNDANT DEGREE-OF-FREEDOM MANIPULATOR
MICROWAVE MONOLITHICS INC 465 EAST EASY STREET UNIT F SIMI VALLEY, CA 93065	14.03-6642 (LERC) HIGH EFFICIENCY LOW COST GaAs MONOLITHIC RF MODULE FOR SARSAT DISTRESS BEACONS
CHARLES EVANS & ASSOC 301 CHESAPEAKE DRIVE REDWOOD CITY, CA 94063	08.13-4567 (ARC) MICROANALYTICAL CHARACTERIZATION OF BIOGENIC COMPONENTS IN INTERPLANETARY DUST
COMPLERE INC PO BOX 1697 PALO ALTO, CA 94302	08.20-5630 (ARC) AN OPTICAL ANGLE OF ATTACK SENSOR

TINI ALLOY CO
1144 65TH ST #A
OAKLAND, CA 94608

06.07-4109 (ARC)
DIGITAL STORAGE MEDIUM USING THIN-FILM SHAPE-MEMORY ALLOY

COLORADO

VEXCEL CORP
2905 WILDERNESS PLACE
BOULDER, CO 80301

07.07-0094 (JPL)
EOS WORKSTATION

CONNECTICUT

SCIENTIFIC RESEARCH ASSOCIATE
50 NYE ROAD PO BOX 1058
GLASTONBURY, CT 06033

05.01-0333 (JPL)
INTELLIGENT MANIPULATION TECHNIQUE FOR MOBILE MULTI-BRANCH ROBOTIC SYSTEMS

SPRINGBORN MATERIALS SCIENCE
10 SPRINGBORN CENTER
ENFIELD, CT 06082

04.07-8371 (KSC)
DEVELOPMENT OF SPECIALIZED FLOOR COVERINGS FOR LAUNCH SITE FACILITIES

PRECISION COMBUSTION INC
25 SCIENCE PARK
NEW HAVEN, CT 06511

01.02-0664 (LERC)
CATALYTIC IGNITION ROTARY COMBUSTION ENGINE

ILLINOIS

GLOBAL INFORMATION SYSTEMS
1800 WOODFIELD DRIVE
SAVOY, IL 61874-9505

06.05-1165 (JSC)
ENHANCED INTELLIGENT EVALUATION SYSTEM FOR SIMULATION TRAINING

MASSACHUSETTS

SPIRE CORP
PATRIOTS PARK
BEDFORD, MA 01730

10.01-6000A (LERC)
INDIUM PHOSPHIDE SOLAR CELLS ON SILICON SUBSTRATES

PHYSICAL SCIENCES INC
RESEARCH PARK PO BOX 3100
ANDOVER, MA 01810

10.01-9039 (LERC)
STUDY OF ARCING ON SPACE STRUCTURES IN LOW EARTH ORBIT

BARR ASSOCIATES INC
2 LYBERTY WAY
WESTFORD, MA 01886

08.01-7513 (JPL)
IMAGE QUALITY SPACE QUALIFIED UV INTERFERENCE FILTERS

CHARLES RIVER ANALYTICS INC
55 WHEELER STREET
CAMBRIDGE, MA 02138

03.07-3474 (ARC)
EXPERT SYSTEMS FOR REAL-TIME MONITORING AND FAULT DIAGNOSIS

SATCON TECHNOLOGY CORP
71 ROGERS STREET
CAMBRIDGE, MA 02139

15.01-0540 (MSFC)
ACTIVE MAGNETIC MICRO-GRAVITY ISOLATOR FOR SPACE STATION

SYMBIOTICS INC
875 MAIN STREET
CAMBRIDGE, MA 02139

06.03-3635 (KSC)
SOCIAL: A DEVELOPMENT FRAMEWORK FOR DISTRIBUTED ARTIFICIAL INTELLIGENCE

GEO CENTERS INC
7 WELLS AVENUE
NEWTON CENTRE, MA 02159

04.01-7070 (LERC)
EMBEDDED FIBER OPTIC SENSORS FOR POLYMER MATRIX COMPOSITE PROCESS MONITORING

MICHIGAN

DAEDALUS ENTERPRISES INC
PO BOX 1869
ANN ARBOR, MI 48106

08.06-5649 (JPL)
DEVELOPMENT OF A PORTABLE MULTISPECTRAL THERMAL INFRARED CAMERA

KMS FUSION INC
3853 RESEARCH PARK DR PO 1567
ANN ARBOR, MI 48106

05.01-8500 (JPL)
HIGH PERFORMANCE VIEW-GENERATED DATABASE FOR WORLD MODEL DEFINITION AND UPDATE

NEW HAMPSHIRE

CREARE INC
PO BOX 71 ETNA ROAD
HANOVER, NH 03755

01.01-3800 (LERC)
MULTIGRID SOLUTION OF INTERNAL FLOWS USING UNSTRUCTURED SOLUTION ADAPTIVE MESHES

NEW JERSEY

ML ENERGIA INC
PO BOX 1468
PRINCETON, NJ 08542

02.06-7970 (ARC)
PHOTOCHEMICAL IGNITION AND ENHANCEMENT OF SUPERSONIC COMBUSTION

CONTINUUM DYNAMICS INC
PO BOX 3073
PRINCETON, NJ 08543

02.10-9282 (ARC)
OPTIMIZATION OF ROTOR PERFORMANCE USING A FREE WAKE ANALYSIS

NEW MEXICO

APPLIED TECHNOLOGY ASSOC INC
1900 RANDOLPH RD SE
ALBUQUERQUE, NM 87106

15.01-8371 (LERC)
DAMPER - DIGITAL ACTIVE MATERIALS PROCESSING PLATFORM EFFORT

NEW YORK

PROSPECTIVE COMPUTER ANALYSTS
1800 NORTHERN BOULEVARD
ROSLYN, NY 11576

06.06-4610 (KSC)
CAD/CAE KNOWLEDGE BASE DEVELOPMENT TOOL

COHERENT RESEARCH INC
719 E GENESEE STREET
SYRACUSE, NY 13210

06.06-0929 (JPL)
A KNOWLEDGE-BASED EXPERT SYSTEM TO COORDINATE CAD/CAE WITH INTEGRATION AND TEST

NEVADA

ROSE ENGINEERING & RESEARCH
PO BOX 5146
INCLINE VILLAGE, NV 89450

01.01-5094 (LERC)
INNOVATIVE BOUNDARY LAYER CONTROL METHODS IN HIGH SPEED INLET SYSTEMS

NORTH CAROLINA

TRIANGLE R&D CORP
PO BOX 12696
RESEARCH TRIANGLE PARK, NC 27709

05.01-2878 (GSFC)
TELEROBOTIC RENDEZVOUS AND DOCKING VISION SYSTEM ARCHITECTURE

PENNSYLVANIA

APD CRYOGENICS INC.
1919 VULTEE STREET
ALLENTOWN, PA 18103

08.12-3708A (ARC)
THREE STAGE LINEAR SPLIT-STIRLING CRYOCOOLER FOR 1 TO 2K MAGNETIC COLD STAGE

VIRGINIA

DECISION SCIENCE CONSORTIUM
1895 PRESTON WHITE DR #300
RESTON, VA 22091

03.03-0660 (ARC)
AERONAUTICAL HUMAN FACTORS RESEARCH

DIGITAL SIGNAL CORP
8003 FORBES PLACE
SPRINGFIELD, VA 22151

05.01-4910 (LARC)
IMPROVEMENT OF RANGE OF COHERENT LASER RADAR

MERIDIAN CORP
4300 KING STREET SUITE 400
ALEXANDRIA, VA 22302

05.01-3600 (JPL)
FORCE REFLECTING HAND CONTROLLER FOR MANIPULATOR TELEOPERATION

TEXAS

APEIRON
14902 PRESTON RD SUITE 212-180
DALLAS, TX 75240

13.02-2423A (KSC)
WIRELESS HEADSET NETWORK

PHYTORESOURCE RESEARCH INC
707 TEXAS AVENUE SUITE 101-E
COLLEGE STATION, TX 77840

12.07-8606 (KSC)
DEVELOPMENT OF A SPACE RATED NUTRIENT DELIVERY ROOT SUPPORT SYSTEM

NORTH AMERICAN AEROSPACE CORP
PO BOX 162284
AUSTIN, TX 78716-2284

03.07-0979 (ARC)
AIRCRAFT FLIGHT TESTING TECHNIQUES AND INSTRUMENTATION

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Jim Ball
Headquarters, Washington, D.C.
(Phone: 202/453-2927)

February 17, 1989

RELEASE: 89-19

NASA SELECTS SMALL BUSINESS INNOVATION RESEARCH PHASE II PROJECTS

NASA announced today the selection of 39 research proposals for negotiation of Phase II contract awards in their Small Business Innovation Research (SBIR) program. Included are 39 small, high technology firms located in 11 states.

This is the second group of selections made from a total of 179 proposals submitted by SBIR contractors completing Phase I projects. The 39 selections, valued at approximately $19 million, add to 61 Phase II selections previously announced on December 7, 1988, bringing the total to 100 selections valued at approximately $48 million.

SBIR goals are to stimulate technological innovation, increase the use of small business (including minority and disadvantaged firms) in meeting federal research and development needs, and increase private sector commercialization of results of federally funded research.

Phase I project objectives are to determine feasibility of research innovations meeting agency needs. Phase II continues development of the most promising Phase I projects. Selection criteria include technical merit of the Phase I results and the proposed Phase II activity, the value to NASA, and the capabilities of the proposing small firms. Phase II funding may be up to $500,000 over a period of 2 years.

SBIR projects are procured and managed by 9 NASA field centers. NASA's Office of Commercial Programs, NASA Headquarters, Washington, D.C., provides overall program management.

- more -

Selected SBIR firms are located in California, Colorado, Connecticut, Illinois, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, New York, Nevada, North Carolina, Pennsylvania, Texas and Virginia.

- end -

A list of SBIR Phase II proposals selected for negotiation can be obtained by phoning the NASA Headquarters Newsroom on 202/453-8400.

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Jim Cast
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

February 17, 1989

Pam Alloway
Johnson Space Center, Houston
(Phone: 713/483-5111)

Lt. Col. Rick Oborn
Department of Defense, Washington, D.C.
(Phone: 202/697-5131)

RELEASE: 89-20

ORBITAL DEBRIS STUDY COMPLETED

The U.S. government today released results of a 6-month interagency study on orbital debris.

The study, co-chaired by NASA and the Department of Defense, cites satellite and rocket body fragmentation as the principal source of orbital debris and concludes that, left unchecked, the growth of debris could threaten the safe and reliable operation of manned and unmanned spacecraft in the next century.

A major finding concerns the limits of our knowledge about the current population of orbital debris objects. While the U.S. Space Command routinely tracks objects in space that are larger than a softball (about 10 centimeters and larger), the ability to track smaller objects is hampered by system design. The uncertainty, therefore, as to exactly how much debris is in orbit makes it difficult to assess the true risk posed to spacecraft. This, in turn, creates uncertainty as to the urgency for action and the potential effectiveness of any corrective action. The report states that the need for enhancing debris measurement capabilities "has been universally recognized."

The report reviews current policies and activities designed to reduce debris or mitigate its effects and explores potential opportunities for further action. International efforts, legal issues and commercial regulation also are examined.

- more -

Along with NASA and DOD, other federal organizations participating in the orbital debris study included the Departments of State, Commerce, Transportation and Treasury as well as the Office of Management and Budget, Federal Communications Commission and the Intelligence Community Staff.

- end -

NOTE TO EDITORS:

A fact sheet concerning the orbital debris study follows. Limited quantities of the report itself are available in the newsrooms of NASA Headquarters, Johnson and Kennedy Space Centers and at the Office of Secretary of Defense/ Public Affairs.

NASA Facts

National Aeronautics and
Space Administration

Washington, D.C.
20546

February 17, 1989

ORBITAL DEBRIS STUDY

The U.S. government today released the Interagency Group (Space) Report on Orbital Debris.

The report is the culmination of an intensive 6-month study, which was initiated in response to a directive contained within the National Space policy approved by President Reagan in February 1988. The directive stated that "all space sectors will seek to minimize the creation of space debris. Design and operations of space tests, experiments and systems will strive to minimize or reduce accumulation of space debris consistent with mission requirements and cost effectiveness."

An interagency working group was tasked last July by the National Security Council to review the extent of the orbital debris problem, identify options for minimizing or reducing the accumulation of orbital debris and its impact on future space activities and recommend courses of action. The group was co-chaired by senior officials from NASA and DOD and included representatives from the departments of State, Commerce, Transportation and Treasury, as well as the Office of Management and Budget, the Federal Communications Commission and the Intelligence Community Staff.

The report is written in concise, non-technical language. It begins with a description of the current space environment, a discussion about the major sources of debris, and an assessment of the implications of current debris growth trends. It then reviews current policies and activities designed to reduce debris or mitigate its effects and explores potential opportunities for further action. International efforts, legal issues and commercial regulation also are examined.

According to the report, the principal source of orbital debris has been fragmentation of satellites and rocket bodies. Other sources include inactive satellites and objects discarded during satellite delivery or operations, such as lens caps, packing devices or empty propellant tanks. The report concludes that, left unchecked, the growth of debris could threaten the safe and reliable operation of manned and unmanned spacecraft in the next century.

- more -

A major finding of the report is that not enough is known about the extent of the problem posed by small debris in the orbital environment. Although the U.S. Space Command routinely tracks objects in space that are larger than about 10 centimeters in diameter, the limited ability (a design limitation) of current surveillance systems to detect and track the much greater number of small debris objects creates high uncertainty in the debris environment models that scientists have constructed. This makes it difficult to assess the true risk posed to spacecraft by orbiting debris, which in turn creates uncertainty as to the urgency for action and the potential effectiveness of any corrective measure. The report states that the need for enhancing debris measurement capabilities "has been universally recognized."

The report's recommendations call for appropriate agencies to make debris minimization a design consideration for all future civil, military and commercial launch vehicles, upper stages, satellites, space tests and missions. This would include promulgating and implementing agency-level internal policy guidance consistent with the debris minimization directive of the National Space Policy. The report also recommends that NASA and DOD undertake a joint study to develop a comprehensive R&D plan to improve orbital debris environment monitoring, statistical modeling and data management capabilities. A second joint study, to be undertaken by NASA and DOD in consultation with the Department of Transportation and the commercial space sector, would construct a basic research plan for developing technologies and procedures for debris minimization and spacecraft survivability.

The report further recommends a continuing dialog between the federal government and industry, recognizing that any imposition of requirements on the private space sector to control or prevent the proliferation of space debris will have important commercial implications.

The report also includes these recommendations:

-- Current agency operational practices for debris mitigation during launch and space operations should be continued and, where feasible and cost-effective, improved.

-- The following activities should be emphasized and, where appropriate, accelerated:

- efforts to improve debris characterization measurements and inventory through use of ground-based radars and development of an improved data base

- modeling and statistical analysis of the debris characterization measurements

- analysis of physical evidence returned from space

- technological research directed toward improved spacecraft shielding and a better understanding of the fragmentation processes that result from hypervelocity collisions

- licensing agency development of performance requirements and regulations to guide private industry activities

- ongoing studies of design and operations techniques to minimize the cost of debris elimination

-- Representatives of commercial licensing agencies (DOT, DOC and FCC) should continue their discussions to define the boundaries of regulatory authority among the licensing agencies over commercial activities that may produce orbital debris.

-- An ad hoc interagency working group on orbital debris, chaired by NASA and DOD, should be retained as a coordinating mechanism for issues, policies and activities concerning the orbital debris problem.

-- The U.S. should inform other spacefaring nations about the conclusions of this report and seek to enhance understanding about orbital debris issues. As appropriate, the U.S. should enter into discussions with other nations to coordinate debris minimization policies and practices.

-- Within 18 months, an interagency working group should develop a long-term strategy for researching, developing and implementing means to minimize the accumulation of orbital debris and protect spacecraft operations (within an acceptable level of risk) from collision with debris objects. As a minimum, this strategy should include establishing long-range goals, providing a milestone plan and schedule leading to achievement of these long-term goals, and preliminary resource implications.

The Interagency Group (Space) Report on Orbital Debris is being prepared for printing, and finished copies will be available for distribution by early April 1989. Meanwhile, a limited number of photocopies is now available upon request.

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

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Headquarters, Washington, D.C.
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February 22, 1989

Linda Ellis
Lewis Research Center, Cleveland
(Phone: 216/433-2900)

RELEASE: 89-21

LEWIS RESEARCH CENTER WINS QUALITY IMPROVEMENT PROTOTYPE AWARD

NASA's Lewis Research Center (LeRC), Cleveland, has been selected by the Office of Management and Budget (OMB) as a quality improvement prototype which is one of the highest honors a federal government facility can achieve for quality and productivity.

The Quality Improvement Award is part of the President's Productivity Improvement Program. The program is administered by OMB and is the second year the national award has been presented.

In announcing the selection, OMB Director Joseph Wright stated: "A prototype organization demonstrates an extraordinary commitment to quality improvement, focuses attention on satisfying its customers and establishes high standards of quality, timeliness and efficiency. This kind of organization also serves as a model for the rest of government, showing how a commitment to quality leads to better and more efficient services and products for its customers."

LeRC is the only research and development facility selected out of the six facilities.

"It is an honor to have one of NASA's centers selected for this prestigious award," said NASA Administrator Dr. James Fletcher. "I commend the NASA Lewis team that made this award possible."

Factors cited in the selection of LeRC included:

o A focus on team involvement and customer satisfaction as central priorities;

- o Dramatic increases in the number of invention and technical publications;

- o Receipt over the last 5 years of approximately 75 percent of the Innovation Research-100 awards, presented to NASA by Research and Development Magazine, for the most outstanding technical contributions in the world.

- o Receipt of the prestigious Collier trophy in 1987, awarded by the National Aeronautic Association, for the most outstanding aeronautics or astronautics achievement in the U.S. This was the first time NASA received the trophy for an aeronautics achievement. NASA previously won the trophy for astronautic achievements such as the Space Shuttle and Skylab; and

- o Numerous and continuing process improvements in technical and administrative areas.

The selection of this award makes NASA eligible to apply for the President's award in quality and productivity for the next 4 years.

-end-

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For Release:

Jim Ball
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February 22, 1989

Carolynne White
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-8956)

RELEASE: 89-22

NASA/UNIVERSITY COLLABORATION MAY YIELD AUTOMATIC GLUCOSE MONITOR

An implantable device that would mark a major advance for insulin-dependent diabetics is now being developed in a collaborative effort among the Johns Hopkins University Applied Physics Laboratory (APL), Laurel, Md.; the University of New Mexico (UNM), Albuquerque, N.M.; and NASA's Goddard Space Flight Center, Greenbelt, Md.

Currently known as rechargeable physiologic sensor (RePS), the device would eliminate the numerous daily finger pricks, required of the estimated 1 million type 1, insulin-dependent patients in the U.S., for proper monitoring of glucose level. The device also would provide a more accurate analysis of glucose level than is possible with finger-prick techniques.

APL's Program Manager for RePS, Wade Radford, said the proposed unit will determine the glucose level using a sensor designed by Dr. Ebtisam Wilkins at UNM. Electronics, designed by engineers at APL, will amplify the electronic signal identified by the sensor and send the signal to a receiving unit outside the body, using technology similar to that used by orbiting satellites to telemeter data back to Earth, according to Donald S. Friedman, chief, office of commercial programs at Goddard. The external, hand-held unit then would display the numerical glucose reading necessary for accurate insulin dosage, said Friedman, who also is Goddard program manager for the RePS.

The telemetry system operates on a lithium battery similar in power and size to those used in hearing aids. Because the unit does not need to contact the blood directly, but instead monitors the electrical charge produced when glucose in the body tissue is in proximity to a metallic glucose salt compound present in the device, it can be placed just under the skin in the abdominal area.

- more -

RePS brings to the field of glucose sensor development a quicker, more accurate way to monitor glucose level while eliminating the discomfort of repeated finger pricking. Such accurate monitoring and subsequent control of blood glucose should greatly decrease the severity of diabete complications according to the developers. RePS also is designed to be rechargeable in one step, unlike most other glucose sensors currently being designed.

RePS is being developed as part of a Goddard/APL collaborative program for the development of biomedical implantable devices. As a part of NASA's technology transfer program to find pratical applications for technology designed for space programs, APL receives approximately $300,000 a year for research and development of biomedical implantable devices.

Researchers expect that a prototype RePs will be completed by the end of 1989 and that a unit could be on the market in about 4 years.

- end -

NASA

SPACE SHUTTLE MISSION STS-29
PRESS KIT

MARCH 1989

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CONTENTS

NASA
National Aeronautics and
Space Administration

Washington, D.C.

RELEASE: 89-23 IMMEDIATE

THIRD TRACKING AND DATA RELAY SATELLITE TO BE DEPLOYED BY STS-29

Deployment of the third Tracking and Data Relay Satellite (TDRS-D) will highlight the 28th Space Shuttle mission (STS-29). The assessed launch date is no earlier than March 10, 1989.

Three TDRS, operating from geosynchronous orbit, are required to complete the constellation known as the Tracking and Data Relay Satellite System (TDRSS). TDRSS will increase communications, between Earth-orbiting spacecraft and a ground-based tracking station, from 15 to 85 percent per orbit and facilitate a much higher rate of data flow.

TDRS-C was successfully deployed on STS-26 in September 1988 and is located in geosynchronous orbit at 171 degrees W. longitude, south of Hawaii. TDRS-D will be located at 41 degrees W. longitude, east of Brazil. TDRS-A, deployed on STS-6 in April 1983, then will be moved to a parking orbit and used only if a failure occurs with one of the remaining two satellites. TDRS-B was lost in the 51-L Challenger accident.

Commander of the five-man crew is Michael L. Coats, captain, USN. Coats was pilot of STS 41-D, the maiden flight of orbiter Discovery. John E. Blaha, colonel, USAF, is pilot of the mission. STS-29 will be his first space flight.

Rounding out the crew are three mission specialists: James F. Buchli, colonel, USMC; Robert C. Springer, colonel, USMC; and James P. Bagian, M.D. Buchli is making his third Shuttle flight having flown as a mission specialist on STS 51-C, the first Department of Defense Shuttle mission, and STS 61-A, the West German Spacelab flight. Springer and Bagian are making their first Shuttle flights.

Discovery, making its eighth flight, is assessed to be ready for launch no earlier than 8:11 a.m. EST, March 10, from the Kennedy Space Center, Fla., launch pad 39-B, into a 160 nautical mile, 28.45 degree orbit. Nominal mission duration is 5 days, 1 hour, 7 minutes. Deorbit is planned on orbit 80, with landing scheduled for 9:48 a.m. EST, March 15, at Edwards Air Force Base, Calif. In the event of a slip in the launch, liftoff would occur 1 minute earlier for each day the launch is delayed.

TDRS-D will be deployed 6 hours, 13 minutes into the mission on flight day 1. Two additional deployment opportunities are available on that day and one the following day.

An Air Force-developed inertial upper stage (IUS) will boost the TDRS to geosynchronous orbit (22,300 miles above Earth) after deployment from the Shuttle. The IUS is mated to the TDRS-D and the combination spacecraft and upper stage will be spring ejected from the payload bay of the orbiter.

Following deployment, Discovery will maneuver to a safe position behind and above the TDRS-D/IUS before the first stage of the two-stage IUS motor ignites about an hour after deployment. The three-axis, stabilized upper stage will maneuver TDRS to the desired attitude where it will be configured for operation by the NASA White Sands Ground Terminal, N.M.

CONTEL, Atlanta, Ga., owns and operates the TDRSS for NASA. TRW's Defense and Space Systems Group, Redondo Beach, Calif., builds the satellites.

The Orbiter Experiments Program Autonomous Supporting Instrumentation System (OASIS) will be flown again on STS-29 to record environmental data in the orbiter payload bay during flight phases. OASIS will measure TDRS vibration, strain, acoustics and temperature during launch ascent using transducers affixed directly to the payload.

OASIS flight hardware consists of signal conditioning, multiplexing and recording equipment mounted on a Shuttle adaptive payload carrier behind the TDRS. Command and status interface is achieved through the standard mixed cargo harness and the general purpose computers.

In addition to TDRS-D and OASIS, Discovery will carry the Space Station Heat Pipe Advanced Radiator Element (SHARE) in the payload bay. Several secondary payloads will be carried in the middeck of Discovery, including the IMAX camera, two student experiments, a protein crystal growth experiment and a chromosome and plant cell division experiment.

After landing, Discovery will be towed to the NASA Ames-Dryden Flight Research Facility, hoisted atop the Shuttle Carrier Aircraft and ferried back to the Kennedy Space Center to begin processing for its next flight scheduled for August.

- END OF GENERAL RELEASE -

GENERAL INFORMATION

NASA Select Television Transmission

The schedule for television transmission from the orbiter and for the change-of-shift briefings from Johnson Space Center, Houston, will be available during the mission at Kennedy Space Center, Fla.; Marshall Space Flight Center, Huntsville, Ala.; Johnson Space Center; and NASA Headquarters, Washington, D.C. The television schedule will be updated daily to reflect changes dictated by mission operations. NASA Select television is available on RCA Satcom F-2R, Transponder 13, located at 72 degrees west longitude.

Special Note To Broadcasters

Beginning in February and continuing throughout the mission, approximately 7 minutes of audio interview material with the crew of STS-29 will be available to broadcasters by calling 202/269-6572.

Status Reports

Status reports on countdown and mission progress, on-orbit activities and landing operations will be produced by the appropriate NASA newscenter.

Briefings

An STS-29 mission press briefing schedule will be issued prior to launch. During the mission, flight control personnel will be on 8-hour shifts. Change-of-shift briefings by the off-going flight director will occur at approximately 8-hour intervals.

STS-29 QUICK LOOK

Assessed Launch Date: March 10, 1989
Launch Window: 8:11 a.m. - 10:41 a.m. EST
Launch Site: KSC, Pad 39B

Orbiter: Discovery (OV-103)
Altitude: 160 nm
Inclination: 28.45 degrees
Duration: 5 days, 1 hour, 7 minutes

Landing Date/Time: March 15, 1989, 9:48 a.m. EST

Primary Landing Site: Edwards AFB, Calif., Runway 17
Alternate Landing Sites:
- Return to Launch Site - Kennedy Space Center, Runway 33
- Transoceanic Abort Landing - Ben Guerir, Morocco
- Abort Once Around - Edwards AFB, Calif.

Crew: Michael L. Coats, Commander
- John E. Blaha, Pilot
- James F. Buchli, Mission Specialist
- Robert C. Springer, Mission Specialist
- James P. Bagian, Mission Specialist

Primary Payload: Tracking & Data Relay Satellite (TDRS-D)

Secondary Payloads:
- Space Station Heat Pipe Advanced Radiator Element (SHARE)
- Chromosomes & Plant Cell Division (CHROMEX)
- Protein Crystal Growth (PCG)
- Shuttle Student Involvement Program (SSIP) - 2 experiments
- Orbiter Experiments - Autonomous Supporting Instrumentation System (OASIS)
- IMAX Camera

STS-29 MISSION OBJECTIVES

The primary objective of this flight is to successfully deploy the Tracking and Data Relay Satellite-D/Inertial Upper Stage (TDRS-D/IUS). TDRS-D is scheduled to be deployed on flight day 1, orbit 6. Several backup deployment opportunities exist during the flight. Secondary objectives are to perform all operations necessary to support the requirements of the middeck and payload bay experiments.

SUMMARY OF MAJOR FLIGHT ACTIVITIES

Day One
Ascent, Post-insertion checkout
Pre-deploy checkout, TDRS-D/IUS deploy, PCG activation, SSIP

Day Two
TDRS-D/IUS backup deploy opportunity
AMOS, CHROMEX, IMAX, PCG, SSIP, SHARE test 1

Day Three
AMOS, CHROMEX, IMAX, PCG, SSIP, SHARE test 2

Day Four
AMOS, CHROMEX, SSIP

Day Five
Flight control systems checkout, Cabin stowage, Landing preps
CHROMEX, SSIP, PCG deactivation, SHARE deprime

Day Six
SHARE cold soak test, SSIP
Deorbit preparation, Deorbit burn, Landing at EAFB

LAUNCH PREPARATIONS, COUNTDOWN AND LIFTOFF

After the successful STS-26 mission, Discovery was returned to KSC from Dryden Flight Research Facility on Oct. 8. The next day, Discovery was towed to the processing hangar for post-flight deconfiguration and inspections.

As planned, the three main engines were removed in October and taken to the main engine shop in the Vehicle Assembly Building for the replacement of several components. During post-flight inspections, technicians discovered a small leak in the cooling system of the main combustion chamber of the number one main engine. That engine was shipped back to the vendor where repairs could be made and a new engine was shipped from the Stennis Space Center, Miss.

Discovery's three main engines were installed before the end of last year. Engine 2031 is installed in the number one position, engine 2022 is in the number two position and engine 2028 is in the number three position.

The right hand orbital maneuvering system pod was removed in late October and transferred to the Hypergolic Maintenance Facility where a small internal leak was repaired. One of the orbiter's cooling systems, called the flash evaporator system, was replaced after some in-flight problems. Post-flight inspections revealed that the system was clogged with foreign material.

Once the turn-around activities were completed, Discovery was transferred from the Orbiter Processing Facility (OPF) to the Vehicle Assembly Building (VAB) on Jan. 19.

Solid rocket motor (SRM) segments began arriving at KSC in September, and the first segment - the left aft booster - was stacked on Mobile Launcher 2 in VAB high bay 1 on Oct. 21. Booster stacking operations were completed by early December and the external tank was mated to the two boosters on Dec. 16.

The OASIS payload was installed in Discovery's payload bay for flight on Dec. 9. Flight crew members came to KSC to perform the Crew Equipment Interface Test on Dec. 11 to become familiar with Discovery's crew compartment and equipment associated with the mission.

The Tracking and Data Relay Satellite (TDRS-D) arrived at the Vertical Processing Facility (VPF) on Nov. 30, and its Inertial Upper Stage (IUS) arrived Dec. 27. The TDRS/IUS were joined together on Dec. 29 and all integrated testing was performed the first week of January. As part of those tests, Astronauts James Bagian and Robert Springer participated in the mission sequence test to verify payload functions that occur post-launch and during deployment.

A variety of middeck payloads and experiments, some of which are time critical and installed during the launch countdown, are processed through various KSC facilities.

Discovery was moved from the OPF to the VAB on Jan. 23, where it was mated to the external tank and SRBs. A Shuttle Interface Test was conducted to check the mechanical and electrical connections between the various elements of the Shuttle vehicle and onboard flight systems.

The assembled Space Shuttle vehicle was rolled out of the VAB aboard its mobile launcher platform for the 4.2 mile trip to Launch Pad 39-B on Feb. 3. TDRS-D and its IUS upper stage were transferred from the VPF to Launch Pad 39-B on Jan. 17. The payload was installed into Discovery's payload bay on Feb. 6.

A countdown demonstration test, a dress rehearsal for the STS-29 flight crew and KSC launch team and a practice countdown for the launch, was completed on Feb. 7.

Launch preparations scheduled the last 2 weeks prior to launch countdown include change-out of the orbiter SSME liquid oxygen pumps; final vehicle ordnance activities, such as power-on, stray-voltage checks and resistance checks of firing circuits; loading the fuel cell storage tanks; pressurizing the hypergolic propellant tanks aboard the vehicle; final payload closeouts; and a final functional check of the range safety and SRB ignition, safe and arm devices.

The launch countdown is scheduled to pick up at the T-minus-43-hour mark, leading up to the first Shuttle liftoff for the year. The STS-29 launch will be conducted by a joint NASA/industry team from Firing Room 1 in the Launch Control Center.

MAJOR COUNTDOWN MILESTONES

COUNT	EVENT
T-43 Hours	Power up the Space Shuttle vehicle.
T-34 Hours	Begin orbiter and ground support equipment closeouts for launch.
T-30 Hours	Activate orbiter's navigation aids.
T-27 Hours (holding)	Enter first built-in hold for 8 hrs.
T-27 Hours (counting)	Begin preparations for loading fuel cell storage tanks with liquid oxygen and liquid hydrogen.
T-25 Hours	Load fuel cell liquid oxygen.
T-22 Hours, 30 minutes	Load fuel cell liquid hydrogen.
T-22 Hours	Perform interface check between Mission Control and Merritt Island Launch Area (MILA) tracking station.
T-20 Hours	Activate and warm up inertial measurement units (IMUs).
T-19 Hours	Enter the 8-hour, built-in hold. Activate orbiter comm system.
T-11 Hours (holding)	Start 18-hour, 10-minute, built-in hold. Check ascent switch list on orbiter flight and middecks.
T-11 Hours (counting)	Retract Rotating Service Structure.
T-9 Hours	Activate orbiter's fuel cells.
T-8 Hours	Configure Mission Control communications for launch. Start clearing blast danger area.
T-6 Hours, 30 minutes	Perform Eastern Test Range open loop command test.
T-6 Hours	Enter 1-hour built-in hold.
T-6 Hours (counting)	Start external tank chilldown and propellant loading.
T-5 Hours	Start IMU pre-flight calibration.
T-4 Hours	Perform MILA antenna alignment.

COUNT	EVENT
T-3 Hours (holding)	Begin 2-hour built-in hold. Loading external tank completed and tank in stable replenishment mode. Ice team to pad for inspections. Closeout crew to white room to begin prepping orbiter's cabin for flight crew entry. Wake flight crew (launch minus 4 hours, 55 minutes).
T-3 Hours (counting)	Resume countdown.
T-2 Hours, 55 minutes	Flight crew departs O&C Building for 39-B (Launch minus 3 hours, 15 minutes).
T-2 Hours, 30 minutes	Crew enters orbiter vehicle (Launch minus 2 Hours, 50 minutes).
T-60 minutes	Start pre-flight alignment of IMUs.
T-20 minutes (holding)	10-minute, built-in hold begins.
T-20 minutes (counting)	Configure orbiter computers for launch.
T-10 minutes	White room closeout crew cleared through area roadblocks.
T-9 minutes (holding)	10-minute, built-in hold begins. Perform status check and receive Mission Management Team "go."
T-9 minutes (counting)	Start ground launch sequencer.
T-7 minutes, 30 seconds	Retract orbiter access arm.
T-5 minutes	Start auxiliary power units. Arm range safety, SRB ignition systems.
T-3 minutes, 30 seconds	Orbiter goes on internal power.
T-2 minutes, 55 seconds	Pressurize liquid oxygen tank and retract gaseous oxygen vent hood.
T-1 minute, 57 seconds	Pressurize liquid hydrogen tank.
T-31 seconds	"Go" from ground computer for orbiter computers to start the automatic launch sequence.
T-28 seconds	Start SRB hydraulic power units.
T-21 seconds	Start SRB gimbal profile test.
T-6.6 seconds	Main engine start.
T-3 seconds	Main engines at 90 percent thrust.
T-0	SRB ignition, holddown-post release and liftoff.
T+7 seconds	Shuttle clears launch tower and control switches to Houston.

STS-29 TRAJECTORY SEQUENCE OF EVENTS

EVENT	MET (d:h:m:s)	RELATIVE VELOCITY (fps)	MACH	ALTITUDE (ft)
Launch	0:00:00:00			
Begin Roll Maneuver	0:00:00:09	157	.14	593
End Roll Maneuver	0:00:00:17	356	.32	2,749
SSME Throttle Down to 65%	0:00:00:28	652	.58	7,588
Max. Dyn. Pressure (Max Q)	0:00:00:52	1,173	1.08	26,089
SSME Throttle Up to 104%	0:00:00:57	1,274	1.20	30,768
SRB Staging	0:00:02:06	4,169	3.77	155,892
Negative Return	0:00:03:58	6,862	7.09	327,981
Main Engine Cutoff (MECO)	0:00:08:32	24,507	22.70	363,209
Zero Thrust	0:00:08:39			
OMS 2 Burn**	0:00:39:53			
TDRS/IUS Deploy (orbit 5)	0:06:13:00			
Deorbit Burn (orbit 80)	5:00:06:00			
Landing (orbit 81)	5:01:07:00			

* Apogee, Perigee at MECO: 156 x 35 nm
** Direct insertion ascent: No OMS 1 required
Apogee, Perigee post-OMS 2: 160 x 160 nm
Apogee, Perigee post-deploy: 177 x 161 nm

SPACE SHUTTLE ABORT MODES

Space Shuttle launch abort philosophy aims toward safe and intact recovery of flight crew, orbiter and payload. Modes are:

• Abort-To-Orbit (ATO) -- Partial loss of main engine thrust late enough to permit reaching a minimal 105-nm orbit with orbital maneuvering system engines.

• Abort-Once-Around (AOA) -- Earlier main engine shutdown with the capability to allow one orbit around before landing at Edwards AFB, Calif.; White Sands Space Harbor (Northrup Strip), N.M.; or the Shuttle Landing Facility (SLF) at KSC, Fla.

* Trans-Atlantic Abort Landing (TAL) -- Loss of two main engines midway through powered flight would force a landing at Ben Guerir, Morocco; Moron, Spain; or Banjul, The Gambia.

* Return-To-Launch-Site (RTLS) -- Early shutdown of one or more engines and without enough energy to reach Ben Guerir, would result in a pitch around and thrust back toward KSC until within gliding distance of the SLF.

STS-29 contingency landing sites are Edwards AFB, White Sands, Kennedy Space Center, Ben Guerir, Moron and Banjul.

LANDING AND POST-LANDING ACTIVITIES

KSC is responsible for ground operations of the orbiter once it has rolled to a stop on the runway at Edwards AFB. Operations include preparing the Shuttle for the return trip to Kennedy.

After landing, the flight crew aboard Discovery begins "safing" vehicle systems. Immediately after wheelstop, specially garbed technicians will first determine that any residual hazardous vapors are below significant levels for other safing operations to proceed.

A mobile white room is moved into place around the crew hatch once it is verified that there are no concentrations of toxic gases around the forward part of the vehicle. The crew is expected to leave Discovery about 45 to 50 minutes after landing. As the crew exits, technicians enter the orbiter to complete the vehicle safing activity.

Once the initial aft safety assessment is made, access vehicles are positioned around the rear of the orbiter so that lines from the ground purge and cooling vehicles can be connected to the umbilical panels on the aft end of Discovery.

Freon line connections are completed and coolant begins circulating through the umbilicals to aid in heat rejection and protect the orbiter's electronic equipment. Other lines provide cooled, humidified air to the payload bay and other cavities to remove any residual fumes and provide a safe environment inside Discovery.

A tractor will be connected to Discovery and the vehicle will be towed off the runway at Edwards and positioned inside the Mate/Demate Device at the nearby Ames-Dryden Flight Research Facility. After the Shuttle has been jacked and leveled, residual fuel cell cryogenics are drained and unused pyrotechnic devices are disconnected.

The aerodynamic tail cone is installed over the three main engines, and the orbiter is bolted on top of the 747 Shuttle Carrier Aircraft for the ferry flight back to Florida. A refueling stop is necessary to complete the journey.

Once back at Kennedy, Discovery will be pulled inside the hangar-like facility for post-flight inspections and in-flight anomaly troubleshooting. These operations are conducted in parallel with the start of routine systems reverification to prepare Discovery for its next mission.

TRACKING AND DATA RELAY SATELLITE SYSTEM

The Tracking and Data Relay Satellite, TDRS-D, is the fourth TDRS communications spacecraft to be launched aboard the Space Shuttle and completes the constellation of on-orbit satellites for NASA's advanced space communications system. TDRS-1 was launched during Challenger's maiden flight in April 1983. The second was lost during the Challenger accident in January 1986. TDRS-3 was launched successfully on Sept. 29, 1988, during the landmark mission of Discovery, which returned the Space Shuttle to flight.

TDRS-1 is in geosynchronous orbit over the Atlantic Ocean, just east of Brazil (41 degrees west longitude at the equator). When it was launched, it failed to reach its desired orbit because of a failure in the upper-stage booster rocket. A NASA-industry team subsequently conducted a series of delicate spacecraft maneuvers, using on-board thrusters, to place TDRS-1 into the desired 22,300-mile-altitude orbit.

TDRS-3 is in geosynchronous orbit over the Pacific Ocean, south of Hawaii (171 degrees west longitude, also over the equator). It has performed flawlessly in tests and helped support the STS-27 mission in December 1988.

After its launch, TDRS-D will be designated TDRS-4. Following its arrival at geosynchronous orbit and a series of tests, it will replace the partially degraded TDRS-1 over the Atlantic. TDRS-1 then will be moved to 79 degrees west longitude, above the Equator, where it will be used as an on-orbit spare.

The two operational TDRS -- those located at 41 and 171 degrees west longitude -- will support up to 23 user spacecraft simultaneously and provide two basic types of service: a multiple-access service that simultaneously relays data from as many as 19 low-data-rate user spacecraft; and a single-access service that provides two high-data-rate communications relays from each satellite.

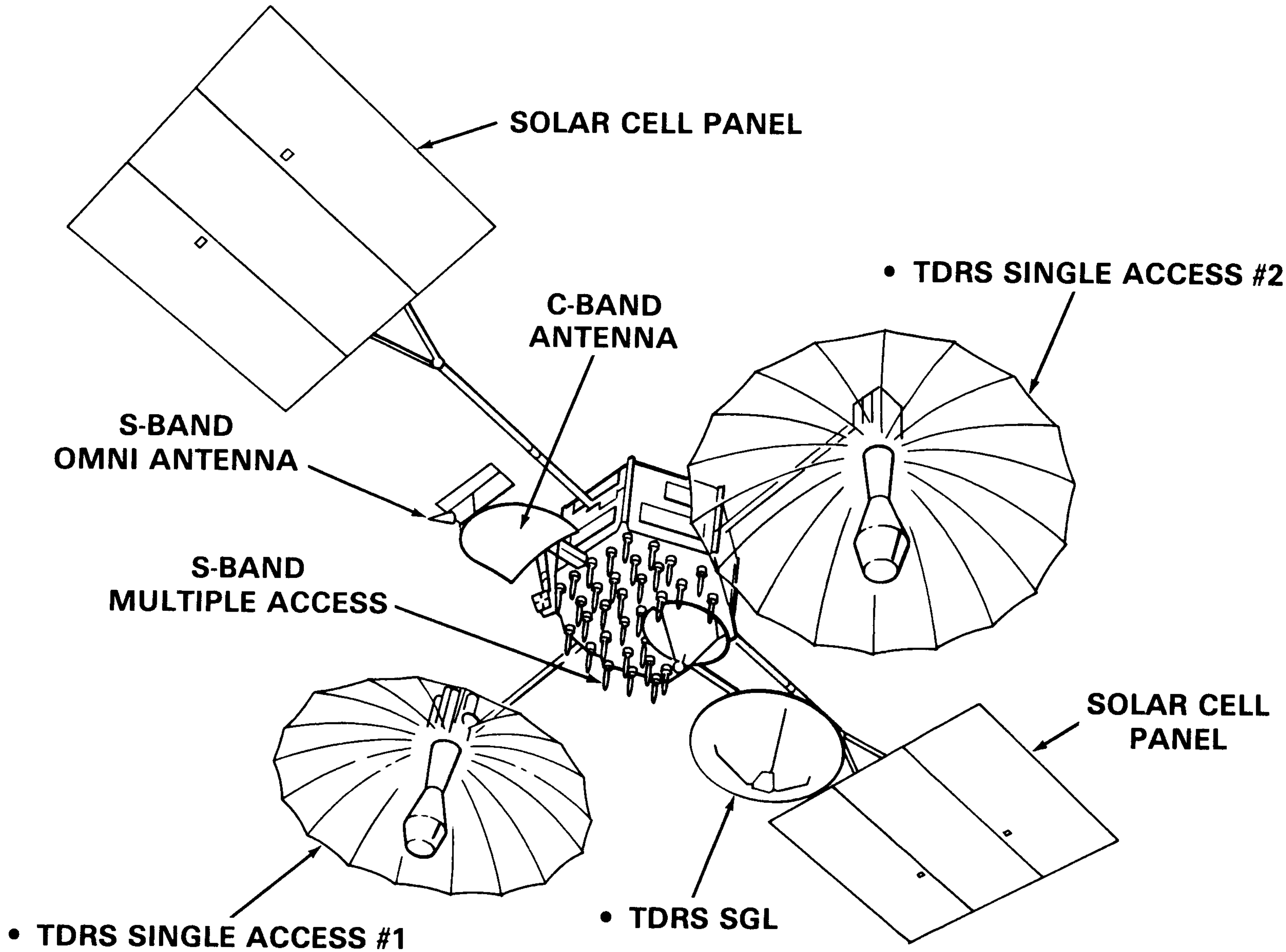
TDRS-4 will be deployed from the orbiter about 6 hours after launch. The solid-propellant Boeing/U.S. Air Force Inertial Upper Stage (IUS) will transfer the satellite to geosynchronous orbit. IUS separation will occur about 13 hours after launch.

The concept of using advanced communications satellites was developed in the early 1970s, following studies showing that a system of communications satellites operated from a single ground terminal could support Space Shuttle and other low-Earth-orbit space missions more effectively than a worldwide network of ground stations. The current ground station network can only provide support for a small fraction -- typically 15 to 20 percent -- of the orbits of user spacecraft. The modern, space-based TDRS network covers at least 85 percent of the orbits.

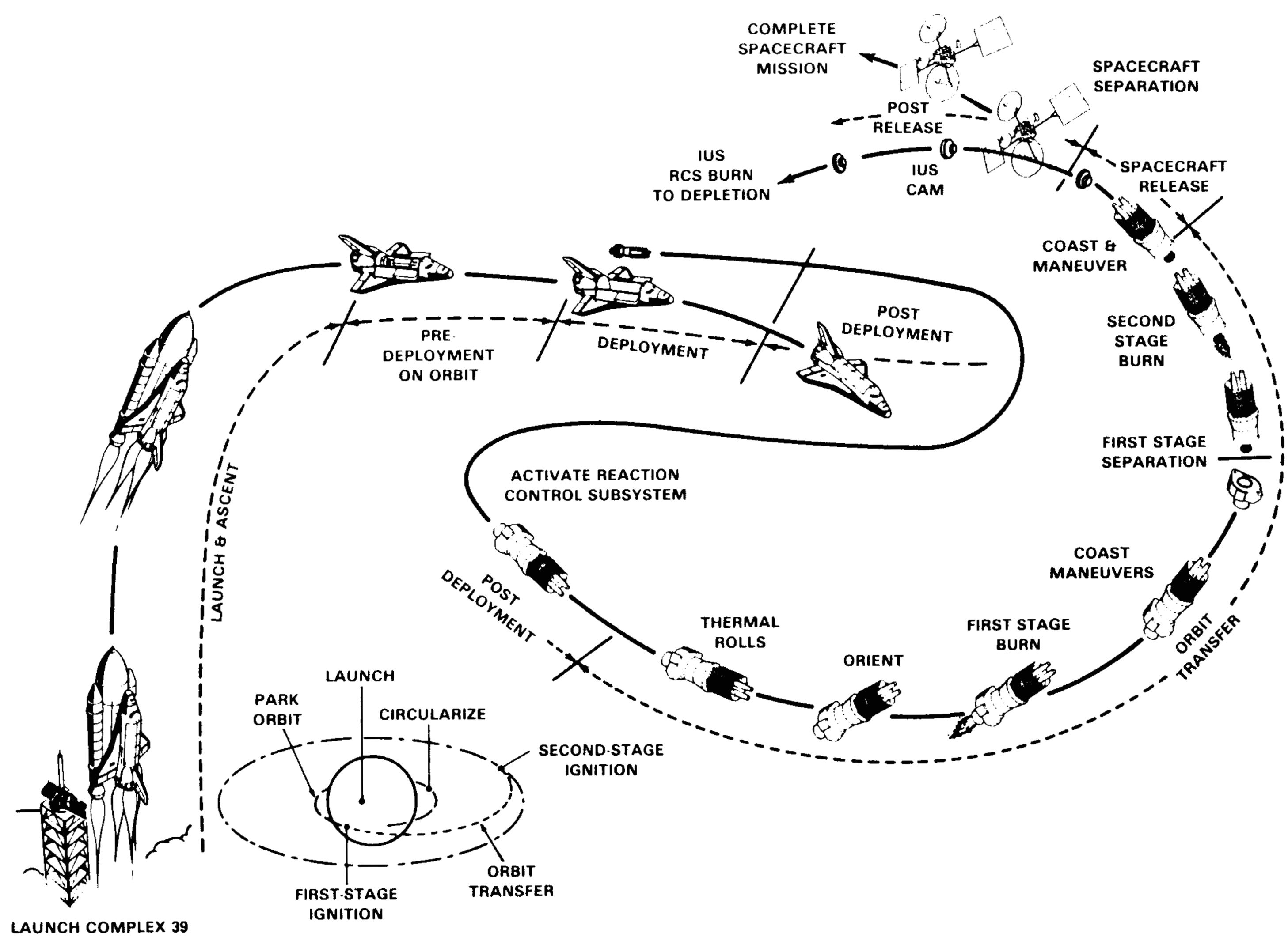
The new system also will facilitate a much higher information flow rate between the spacecraft and the ground. This will be particularly important as NASA resumes regular Shuttle flights and launches satellites with high data rates.

NASA's Space Tracking and Data Network ground stations, managed by the Goddard Space Flight Center, Greenbelt, Md., will be reduced significantly in number. Three of the network's present ground stations -- Madrid, Spain; Canberra, Australia; and Goldstone, Calif. -- already have been transferred to the Deep Space Network, managed by the Jet Propulsion Laboratory, Pasadena, Calif. The remaining ground stations, except those needed for launch operations, will be closed or transferred to other agencies.

TDRS SPACECRAFT



IUS-9/STS-29 MISSION



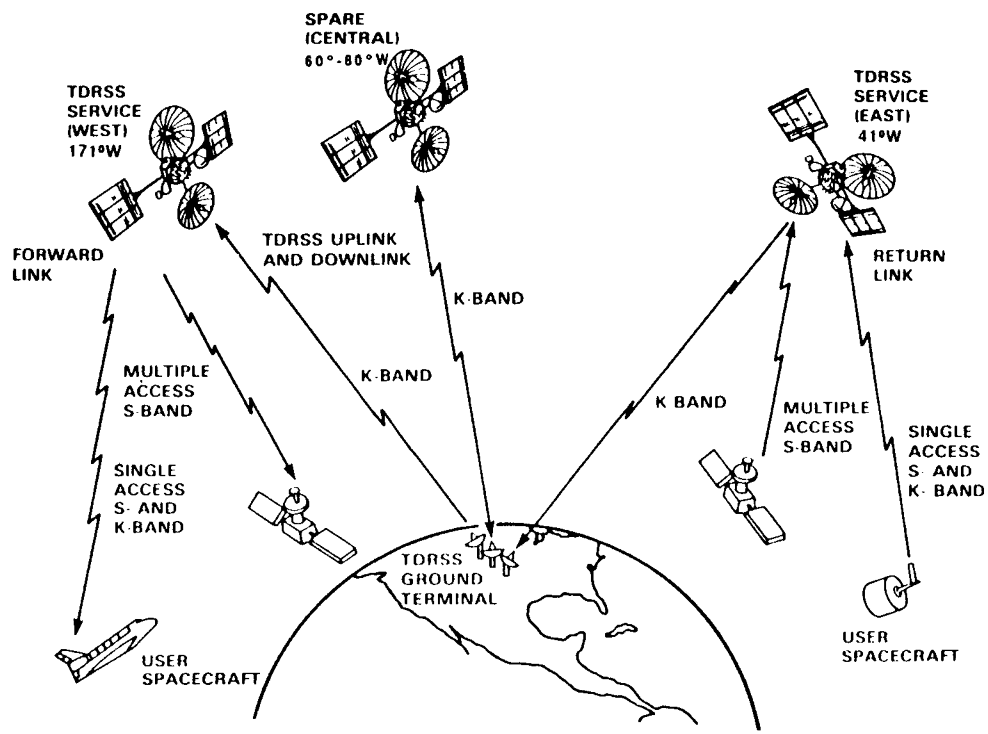
The White Sands Ground Terminal (WSGT) is situated on a NASA test site located between Las Cruces and White Sands, N.M. A colocated NASA facility provides the interface between the WSGT and the NASA space network facilities at Goddard Space Flight Center. A technologically advanced second ground terminal is being built near White Sands to provide back-up and additional capability.

The tracking and data relay satellites are the largest privately owned telecommunications spacecraft ever built, and the first to handle satellite communications through the S and Ku frequency bands. Each weighs about 2 tons, spans almost 60 feet across its solar panels and contains seven antennas. Each of the two gold-plated, single-access antennas measures 16 feet in diameter and, when fully deployed, spans more than 42 feet from tip to tip.

The combination of satellites and ground facilities is referred to as the Tracking and Data Relay Satellite System or TDRSS. NASA leases the TDRSS complement of services from CONTEL, Atlanta, Ga., which is the owner, operator and prime contractor. CONTEL's two primary subcontractors are TRW's Space and Technology Group, Redondo Beach, Calif., and the Harris Corporation's Government Communications Systems Division, Melbourne, Fla. TRW designed and built the spacecraft and software for ground terminal operation, and integrated and tested the system. Harris designed and built the ground terminal equipment.

The Space Shuttle, LANDSAT Earth Resources satellites, Solar Mesosphere Explorer, Earth Radiation Budget Satellite, Solar Maximum Mission satellite and Spacelab have been primary users of TDRSS. They will be joined in the future by the Hubble Space Telescope, Gamma Ray Observatory, Upper Atmosphere Research Satellite and others.

TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS)



INERTIAL UPPER STAGE

The Interial Upper Stage (IUS) will be used to place NASA's TDRS-D into geosynchronous orbit during the STS-29 Space Shuttle mission.

The STS-29 crew will deploy the combined IUS/TDRS-D payload approximately 6 hours, 13 minutes after liftoff, in a low-Earth orbit of 160 nautical miles. Upper stage airborne support equipment, located in the orbiter payload bay, positions the combined IUS/TDRS-D into its proper deployment attitude -- an angle of 52 degrees -- and ejects it into low-Earth orbit. Deployment from the orbiter will be by a spring-ejection system.

Following deployment, the orbiter will move away from the IUS/TDRS-D to a safe distance. The IUS first stage will fire about 1 hour after deployment. After the first stage burn of 146 seconds, the solid fuel motor will shut down. After coasting for about 5 hours, 13 minutes, the first stage will separate and the second stage motor will ignite at 6 hours, 12 minutes after deployment to place the spacecraft in its desired orbit. Following a 108-second burn, the second stage will shut down as the IUS/TDRS-D reaches the predetermined, geosynchronous orbital position.

Thirteen hours, 9 minutes after liftoff, the second stage will separate from TDRS-D and perform an anti-collision maneuver with its onboard reaction control system.

The IUS has a number of features which distinguish it from previous upper stages. It has the first completely redundant avionics system developed for an unmanned space vehicle. It can correct in-flight features within milliseconds.

Other advanced features include a carbon composite nozzle throat, which makes possible the high-temperature, long-duration firing of the IUS motors, and a redundant computer system.

The IUS is 17 ft. long, 9 ft. in diameter and weighs more than 32,500 lb., including 27,400 lb. of solid fuel propellant. The IUS consists of an aft skirt; an aft stage containing 21,400 lb. of solid propellant which generates approximately 42,000 lb. of thrust; an interstage; a forward stage containing 6,000 lb. of propellant generating 18,000 lb. of thrust; and an equipment support section. The equipment support section contains the avionics which provide guidance, navigation, telemetry, command and data management, reaction control and electrical power.

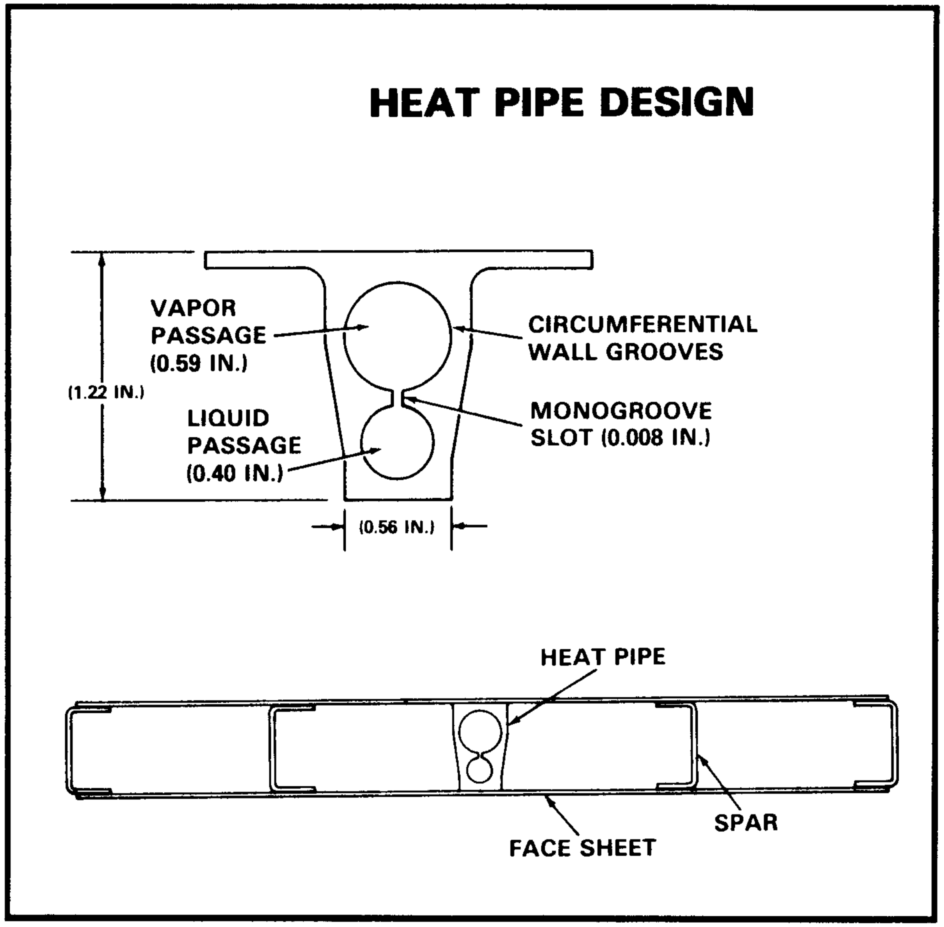
The IUS is built by Boeing Aerospace, Seattle, under contract to the U.S. Air Force Systems Command. Marshall Space Flight Center, Huntsville, Ala., is NASA's lead center for IUS development and program management of NASA-configured IUSs procured from the Air Force.

SECONDARY PAYLOADS

SPACE STATION HEAT PIPE ADVANCED RADIATOR ELEMENT (SHARE)

SHARE flight experiment will be mounted on the starboard sill of the Orbiter's payload bay with a small instrumentation package mounted in the forward payload bay. The goal of the experiment is to test a first-of-its-kind method for a potential cooling system of Space Station Freedom.

The heat pipe method uses no moving parts and works through the convection currents of ammonia. Three electric heaters will warm one end of the 51-foot long SHARE. The heaters turn liquid ammonia into vapor which transports the heat through the length of the pipe, where a foot-wide aluminum fin radiates it into space. The fin is cooled by the space environment, and the ammonia is, in turn, condensed and recirculated.



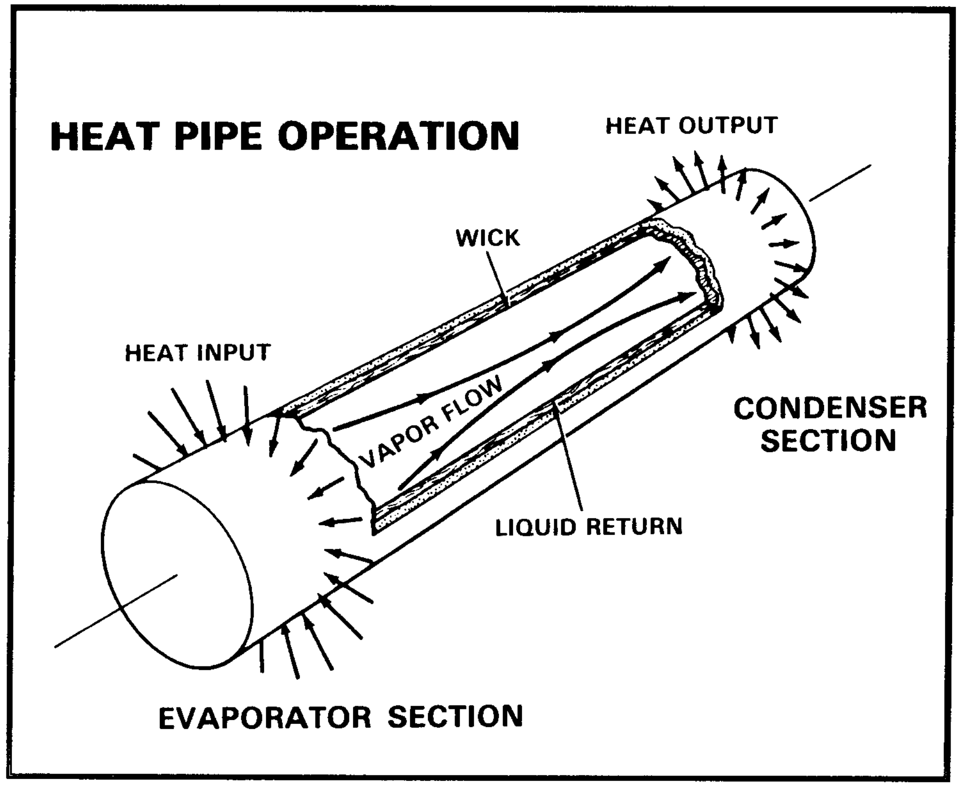
Two small pipes run through the center of the radiator down its length, branching out like the tines of a fork at the end that receives heat, called the evaporator. The top pipe holds the vaporized ammonia; the bottom holds liquid ammonia. In the evaporator portion, a fine wire mesh wick, which works along the same principle as the wick of an oil lamp, pulls the liquid ammonia from one pipe to the other, where it vaporizes. Small grooves allow the condensed ammonia to drop back to the bottom pipe.

The radiator for SHARE weighs about 135 pounds, but with its support pedestals, support beam, heaters and instrumentation package, the total experiment weighs about 650 pounds.

Crew members will switch the heaters on by using controls located on the aft flight deck. Each of the experiment's two 500-watt heaters and single 1,000-watt heater is controlled individually and will be switched on in turn, applying heat that will increase steadily in 500-watt increments up to a maximum of 2,000 watts.

The experiment will be activated for two complete orbits in two different attitudes, the first with the payload bay toward Earth and the second with the orbiter's tail toward the Sun. The heaters will go through a complete 500-watt to 2,000-watt cycle for each activation. This will simulate the heat that needs to be dissipated from the Space Station, and the two attitudes will provide data on the heat pipe's operation in different thermal environments.

Other information also may be obtained during STS-29 if time permits, including a test of the heat pipe's minimum operating temperature, thought to be about minus 20 degrees Fahrenheit, and a test of its ability to recover from acceleration.



The crew may fire the orbiter's aft reaction control system thrusters for about 6 seconds, an action that would push the fluid in SHARE to one end of the pipe. The heaters then may be turned on again to see if the heat pipe will automatically reprime itself and begin operating.

CHROMEX

This experiment will determine whether the roots of a plant in microgravity will develop similarly to those on Earth. Root-free shoots of the plants daylily and haplopappus will be used. The experiment will determine whether:

o The normal rate, frequency and patterning of cell division in the root tops can be sustained in space;

o The chromosomes and genetic makeup is maintained during and after exposure to space flight conditions; and

o Aseptically grown tissue cultured materials will grow and differentiate normally in space.

The criteria for comparison include: number of roots formed, length, weight and quality based on subjective appraisal as well as quantitative morphological and histological examination.

Root tip cells will be analyzed for their karyotype, the configuration of chromosomes, upon return. Haplopappus dicatolydon is a unique flowering plant with four chromosomes in its diploid cells (2n=4). Daylily monocatolydon also has specific features of its karyotype 2n=22.

Daylily and haplopappus gracilis will be flown in the plant growth unit (PGU), located in the orbiter middeck. The PGU can hold up to six plant growth chambers (PGC). One PGC will be replaced with the atmospheric exchange system that will filter cabin air before pumping through the remaining PGCs. The experimental plan is to collect and treat roots post flight, before the first cell division cycle is completed.

Previous observations of some plants grown in space have indicated a substantially lowered level of cell division in primary root tips and a range of chromosomal abnormalities, such as breakage and fusion.

PROTEIN CRYSTAL GROWTH EXPERIMENT

STS-29 protein crystal growth experiments are expected to help advance a technology attracting intense interest from major pharmaceutical houses, the biotech industry and agrichemical companies.

A team of industry, university and government research investigators will explore the potential advantages of using protein crystals grown in space to determine the complex, three-dimensional structure of specific protein molecules.

Knowing the precise structure of these complex molecules provides the key to understanding their biological function and could lead to methods of altering or controlling the function in ways that may result in new drugs.

It is through sophisticated analysis of a protein in crystalized form that scientists are able to construct a model of the molecular structure. The problem is that protein crystals grown on Earth are often small and flawed.

Protein crystal growth experiments flown on four previous Space Shuttle missions already have shown promising evidence that superior crystals can be obtained in the microgravity environment of space flight.

To further develop the scientific and technological foundation for protein crystal growth in space, NASA's Office of Commercial Programs and the Microgravity Science and Applications Division are co-sponsoring the STS-29 experiments being managed through the Marshall Space Flight Center.

During the flight, 60 different crystal growth experiments will be conducted simultaneously using 19 different proteins. The experiment apparatus, first flown aboard Discovery on STS-26, fits into one of the Shuttle orbiter's middeck lockers.

Shortly after achieving orbit, a mission specialist astronaut will initiate the crystal growing process which will continue for several days. The experiment apparatus differs from previous protein crystal payloads in that it provides temperature control and automation of some processes.

After Discovery's landing, the experiment hardware and protein crystals will be turned over to the investigating team for analysis.

Lead investigator for the research team is Dr. Charles E. Bugg of the University of Alabama-Birmingham (UAB). Dr. Bugg is director of the Center for Macromolecular Crystallography, a NASA-sponsored Center for the Commercial Development of Space located at UAB.

Flying crystal growth experiments through their affiliation with the UAB Center for Commercial Development of Space are Dupont; Eli Lilly & Company; Kodak; Merck Institute for Therapuetic Research; Schering-Plough Corp.; Smith, Kline and French; Upjohn; and Biocryst Limited.

STUDENT EXPERIMENTS

Chicken Embryo Development in Space, SE83-9

This experiment, proposed by John C. Vellinger, formerly of Jefferson High School, Lafayette, Ind., will determine the effects of spaceflight on the development of fertilized chicken embryos. Vellinger is now a senior at Purdue University studying mechanical engineering.

The experiment is to fly 32 chicken eggs -- 16 fertilized 2 days prior to launch and the other 16 fertilized 9 days prior to launch -- to see if any changes in the developing embryo can be attributed to weightlessness.

All 32 eggs will be placed in an incubator box, designed by Vellinger and flown aboard Discovery, while an identical group of 32 eggs will remain on Earth as a control group. Throughout the mission, Vellinger will attend to the earthbound eggs much as a mother hen would, turning them five times a day to counter the effects of Earth's gravity on the yolk.

Upon return to Earth, the spaceflight group will be returned to Vellinger, who will open and examine 16 of them. At the same time he will open and examine half the control group eggs. The examinations are intended to identify any statistically significant differences in cartilage, bone and digit structures, muscle system, nervous system, facial structure and internal organs. The other half of the eggs (16 spaceflight and 16 control) will be hatched at 21 days and their weight, growth rate and reproductive rate will be studied.

Vellinger's goal is to determine whether a chicken embryo can develop normally in a weightless environment. The scientific team supporting Vellinger includes: Dr. Cesar Fermin, Tulane University; Dr. Patricia Hester, Purdue University; Dr. Michale Holick, Boston University; Dr. Ronald Hullinger, Purdue University; and Dr. Russell Kerschmann, University of Massachusetts.

Stanley W. Poelstra of Jefferson High School is Vellinger's student advisor. Dr. Lisbeth Kraft, NASA Ames Research Center, Mountain View, Calif., is the NASA technical advisor. Kentucky Fried Chicken, Louisville, is sponsoring the experiment.

The Effects of Weightlessness on the Healing Bone, SE82-8

This is an experiment proposed by Andrew I. Fras, formerly of Binghamton High School, N.Y., to establish whether the environmental effects of spaceflight inhibit bone healing. Fras is now attending Brown University's Medical School.

Observations of rats from previous space flights, as well as non-weight bearing bone studies in gravity using rats, have shown that minerals, calcium in particular, are lost from the body, resulting in a condition similar to osteoporosis. Calcium is the main mineral needed in bone formation. This experiment will fly four Long Evans rats where a minutely small piece of bone will be removed, by a veterinarian, from a non-weight bearing bone. The effects of weightlessness on the origin, development and differentiation of the osteoblasts (bone cells) and their production of callus will be studied. A matched control group will be Earth-based.

Fras, working with scientists and researchers at Orthopedic Hospital and University of Southern California, will attempt to determine whether bone healing in the rat is impeded by the loss of calcium and the absence of weight bearing during space flight.

Andrew Fras is the only student to twice win the NASA/National Science Teachers Association's Space Science Student Involvement Program. His first project, "The Effect of Weightlessness on the Aging of Brain Cells," flew on STS 51-D in 1985.

Fras' student advisor is Howard I. Fisher of Binghamton High School. Orthopaedic Hospital/University of Southern California, Los Angeles, is sponsoring the experiment and providing advice, direction and scientific monitoring; the advisors are Dr. June Marshall and Dr. Augusto Sarmiento. Dr. Emily Holton, NASA Ames Research Center, Mountain View, Calif., is serving as the NASA technical advisor.

IMAX

The IMAX project is a collaboration between NASA and the Smithsonian Institution's National Air and Space Museum to document significant space activities using the IMAX film medium. This system, developed by the IMAX Systems Corp., Toronto, Canada, uses specially-designed 70mm film cameras and projectors to record and display very high definition large-screen color motion picture images.

IMAX cameras previously have flown on Shuttle missions 41-C, 41-D and 41-G to document crew operations in the payload bay and the orbiter's middeck and flight deck along with spectacular views of space and Earth. Film from those missions form the basis for the IMAX production, "The Dream is Alive." On STS 61-B, an IMAX camera, mounted in the payload bay, recorded extravehicular activities in the EASE/ACCESS space construction demonstrations.

The IMAX camera will be used to gather material on the use of observations of the Earth from space for a new IMAX film to succeed "The Dream is Alive."

AIR FORCE MAUI OPTICAL SITE CALIBRATION TEST

The Air Force Maui Optical Site (AMOS) tests allow ground-based electro-optical sensors located on Mt. Haleakala, Maui, Hawaii, to collect imagery and signature data of the orbiter during cooperative overflights.

The scientific observations made of the orbiter, while performing reaction control system thruster firings, water dumps or payload bay light activation, are used to support the calibration of the AMOS sensors and the validation of spacecraft contamination models. The AMOS tests have no payload unique flight hardware and only require that the orbiter be in predefined attitude operations and lighting conditions.

The AMOS facility was developed by Air Force Systems Command (AFSC) through its Rome Air Development Center, Griffiss Air Force Base, N.Y., and is administered and operated by the AVCO Everett Research Laboratory in Maui. The principal investigator for the AMOS tests on the Space Shuttle is from AFSC's Air Force Geophysics Laboratory, Hanscom Air Force Base, Mass. A co-principal investigator is from AVCO.

Flight planning and mission support activities for the AMOS test opportunities are provided by a detachment of AFSC's Space Division at Johnson Space Center, Houston. Flight operations are conducted at JSC Mission Control Center in coordination with the AMOS facilities located in Hawaii.

ORBITER EXPERIMENTS AUTONOMOUS SUPPORTING INSTRUMENTATION

Special instrumentation to record the environment experienced by Discovery during the STS-29 mission is mounted in the orbiter payload bay.

Called OASIS, the instrumentation is designed to collect and record a variety of environmental measurements during various in-flight phases of the orbiter. The primary device is a large tape recorder mounted on the aft port side of the orbiter. The OASIS recorder can be commanded from the ground to store information at a low, medium or high data rate. After Discovery's mission is over, the tapes will be removed for analysis.

The information will be used to study the effects on the orbiter of temperature, pressure, vibration, sound, acceleration, stress and strain. It also will be used to assist in the design of future payloads and upper stages.

OASIS is about desk-top size, approximately 4 feet in length, 1 foot in width, 3 feet in depth and weighs 230 pounds.

The OASIS data is collected from 101 sensors mounted along the sills on either side of the payload bay, on the airborne support equipment of the Inertial IUS and on the tape recorder itself. These sensors are connected to accelerometers, strain gauges, microphones, pressure gauges and various thermal devices on the orbiter.

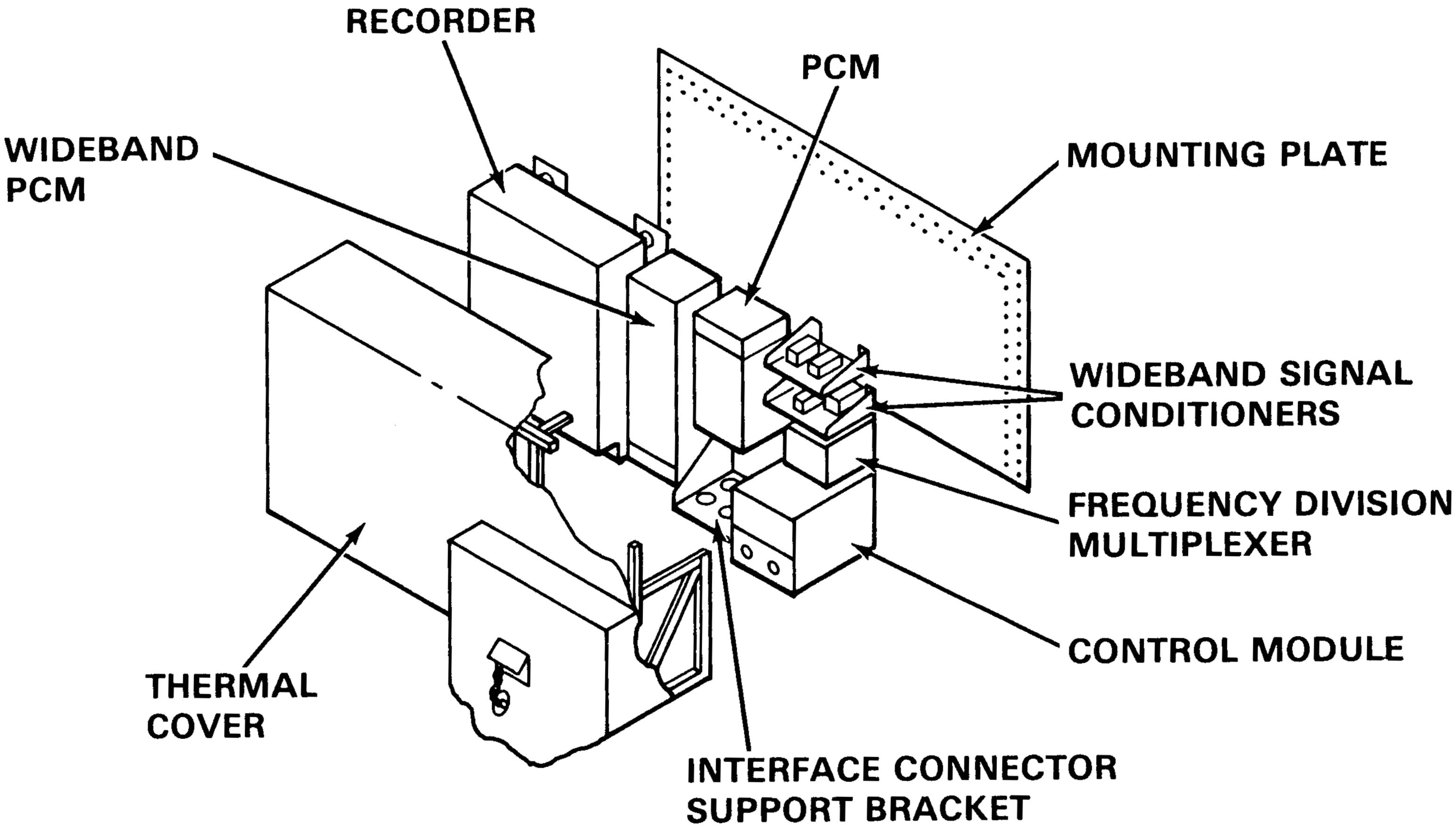
OASIS was launched aboard Discovery on STS-26 in September 1988. Upon return to KSC, the OASIS recorder was removed from the payload bay and the tape analyzed. Use of this data improved efficiency in turnaround of the IUS airborne support equipment for Discovery's STS-29 mission. As more OASIS data is collected, it will be increasingly beneficial for future IUS flights on the Space Shuttle.

On STS-29 launch day, the system will be turned on 9 minutes before Discovery's liftoff to begin recording at high speed to recover high fidelity data. Following the first burn of the orbital maneuvering system, the recorder will be switched to the low data rate and will be commanded again to high speed for subsequent OMS burns.

Different data rates are to be commanded from the ground at various times during the on-orbit operations. If tape remains, the recorder will operate during descent.

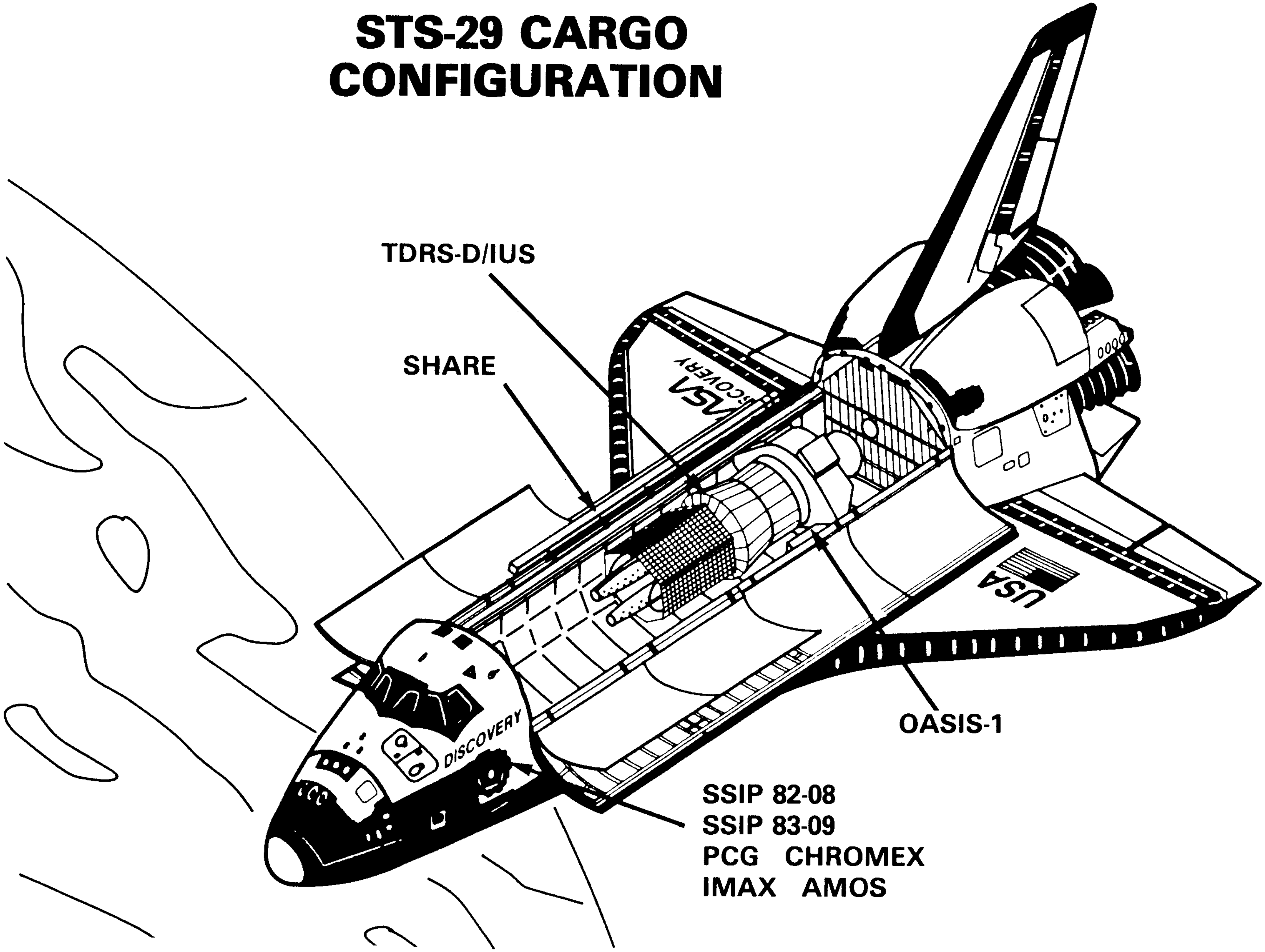
NASA is flying OASIS aboard Discovery in support of the IUS program office of the Air Force Space Division. The system was developed by Lockheed Engineering and Management Services Company under a NASA contract. Development was sponsored by the Air Force Space Division.

OASIS



RECORDER
PCM
WIDEBAND
PCM
MOUNTING PLATE
WIDEBAND SIGNAL
CONDITIONERS
FREQUENCY DIVISION
MULTIPLEXER
CONTROL MODULE
THERMAL
COVER
INTERFACE CONNECTOR
SUPPORT BRACKET

STS-29 CARGO CONFIGURATION



STS-29 PAYLOAD AND VEHICLE WEIGHTS

VEHICLE/PAYLOAD	WEIGHT (Pounds)
Discovery Orbiter (Empty)	176,019
TDRS-D/IUS	43,212
OASIS I	223
CHROMEX	92
IMAX	276
IUS Support Equipment	204
PCG	81
SHARE	637
SSIP (2)	128
Orbiter and Cargo at SRB Ignition	263,289
Total Vehicle at SRB Ignition	4,525,139
Orbiter Landing Weight	194,616

SPACEFLIGHT TRACKING AND DATA NETWORK

Although primary communications for most activities on STS-29 will be conducted through the orbiting Tracking and Data Relay Satellites (TDRS-1 and TDRS-3), NASA Spaceflight Tracking and Data Relay Network (STDN)-controlled ground stations will play a key role in several mission activities. In addition, the stations, along with the NASA Communications Network (NASCOM), at Goddard Space Flight Center, Greenbelt, Md., will serve as backups for communications with Space Shuttle Discovery should a problem develop in the satellite communications.

Three of the 14 stations serve as the primary communications focal point during the launch and ascent phase of the Shuttle from Kennedy Space Center, Fla. They are Merritt Island and Ponce de Leon in Florida and Bermuda downrange from the launch site. For the first minute and 20 seconds, all voice, telemetry and other communications from the Shuttle are relayed to the mission managers at Kennedy and at Johnson Space Center, Houston, by way of the Merritt Island facility.

At 1 minute, 20 seconds, the communications are picked up from the Shuttle and relayed to KSC and JSC from the Ponce de Leon facility, 30 miles north of the launch pad. This facility provides the communications for 70 seconds, or during a critical period when exhaust energy from the solid rocket motors "blocks out" the Merritt Island antennas.

The Merritt Island facility resumes communications to and from the Shuttle after those 70 seconds and maintains them until 6 minutes, 30 seconds after launch when communications are "switched over" to Bermuda. Bermuda then provides the communications until 8 minutes, 45 seconds after liftoff when the TDRS-1 (East) satellite acquires the Shuttle.

Another critical point in the mission is deployment of TDRS-D from the orbiter. Ground stations at Canberra, Australia; Goldstone, Calif.; Hawaii; and Guam provide the communications for the crucial time the satellite is being transferred to geosynchronous orbit, 22,300 miles above Earth.

Another time the ground stations will play a key role is during the landing. The facilities at the Ames-Dryden Flight Research Facility and the Goldstone Deep Space Network stations provide primary communications for the Shuttle during its approach and landing at nearby Edwards Air Force Base.

More than 1,500 persons will maintain the stations on a 24-hour basis during the 5-day mission. In addition to the 14 ground stations, there are six major computing interfaces located at the Network Control Center and the Flight Dynamics Facility, both at Goddard; Western Space and Missile Center, Vandenberg AFB, Calif.; Air Force Satellite Control Facility, Colorado Springs; White Sands Missile Range, N.M.; and the Eastern Space and Missile Center, Fla.

The Merritt Island station provides the data to KSC and JSC during pre-launch testing and the terminal countdown. In addition to Merritt Island, Ponce de Leon and Bermuda, which provide S-band communications during launch and ascent, C-band facilities at Bermuda; Antigua; Cape Canaveral Air Force Station and Patrick Air Force Base, both in Florida; and Wallops Flight Facility, Va., provide tracking data, both high and low speed, to KSC and JSC.

S-band systems carry radio frequency transmissions of command and telemetry. C-band stations provide radar (skin) tracking for orbit determination. Ultra high frequency air/ground stations provide astronaut voice communications with the ground.

NASA plans to close some of its stations as the satellite tracking system becomes more operational. Subject to the successful deployment and testing of TDRS-4, four ground stations -- Ascension Island, Guam, Hawaii and Santiago, Chile -- are expected to be transferred to other agencies or closed in the next several months.

Currently, Yarragadee, Australia, is part of NASA's laser network and will be available for use in an emergency during NASA missions as a backup to TDRS-West (TDRS-3).

MCC REAL TIME DATA SYSTEM (RTDS)

The real time data system is an intelligent, real-time assistant to the flight controllers in the Mission Control Center, Johnson Space Center, during a Shuttle mission. Flight controller expertise is represented in the form of algorithms and expert systems. The expert systems monitor performance of various Shuttle systems. RTDS runs on MASSCOMP mini-computers which have multiple processors.

During a mission, the expert systems process Shuttle downlink data and display the results to flight controllers. Information is presented to the flight controllers through familiar graphs and schematics, indicating anomalies through color highlights, text messages and tones. RTDS is significant because much of the monitoring work traditionally done by the flight controller and other staff can now be off-loaded to the expert system, leaving the flight controller free to perform other tasks.

RTDS was used during STS-26 to aid flight controllers in monitoring Shuttle main engine performance during the critical ascent phase and the deployment of the Tracking and Data Relay Satellite. Based on the success of RTDS during the STS-26 mission, the system has been expanded and incorporated into other Shuttle flight control disciplines.

During STS-29, RTDS will be used to aid the integrated communications officer, booster, mechanical, manipulator and crew systems flight controllers. RTDS displays have been installed into and around the consoles of these three flight control disciplines, providing the information to perform certain flight control tasks. Additionally, the electronic analog of certain cockpit instruments, such as the attitude and direction indicator, are being modeled on the RTDS displays to give flight control personnel an understanding of the information available to the astronauts flying in the Shuttle.

RTDS represents the first operational use of real-time expert system technologies for manned spacecraft monitoring and as such, has provided a hands-on understanding of these technologies. The system will be expanded on future flights to include additional controller functions.

CREW BIOGRAPHIES

MICHAEL L. COATS, 43, captain, USN, is mission commander. Born in Sacramento, Calif., he considers Riverside, Calif., his hometown. Coats is a member of the astronaut class of 1978.

Coats was pilot of the 14th Space Shuttle mission (41- D) launched Aug. 30, 1984, marking orbiter Discovery's maiden flight. The 41-D crew earned the nickname "Icebusters" because of their successful removal of hazardous ice particles from the orbiter using the remote manipulator system. The flight included several "firsts:" The first time three communications satellites were deployed during one mission; the first "frisbee" satellite deployment; and the first time a commercial payload specialist flew aboard the Shuttle.

Coats has logged more than 144 hours in space. He earned a B.S. degree from the U.S. Naval Academy in 1968, a M.S. degree in administration of science and technology from George Washington University in 1977, and a M.S. in aeronautical engineering from the U.S. Naval Postgraduate School in 1979.

Coats became a naval aviator in September 1969 and served 25 months as an A-7E pilot aboard the USS Kittyhawk. During that time, he flew 315 combat missions in Southeast Asia. Coats, in 1974, attended test pilot training. Following his training, he was project officer and the test pilot for the A-7 and A-4 aircraft at the Strike Aircraft Test Directorate and served as a flight instructor at the U.S. Naval Test Pilot School from April 1976 to May 1977. He has logged more than 4,700 hours flying time and 400 carrier landings in 22 different types of aircraft.

JOHN E. BLAHA, 46, colonel, USAF, is pilot. He was born in San Antonio, Texas. Blaha, making his first flight, is a member of the astronaut class of 1980.

He has been an ascent, orbit, planning and entry capsule communicator (CAPCOM) in the Mission Control Center for seven Shuttle flights. Blaha was lead CAPCOM for the STS 41-D and STS 41-G missions. He served as the astronaut office representative of the Space Shuttle ascent/abort reassessment team and the orbital maneuvering system/reaction control system reassessment group.

Blaha earned a B.S. degree in engineering science from the U.S. Air Force Academy in 1965 and a M.S. degree in astronautical engineering from Purdue University in 1966. He received his pilot wings in 1967. He then served as an operational pilot flying A-37, F-4, F-102 and F-106 aircraft and completed 361 combat missions in Southeast Asia.

Blaha attended the USAF Aerospace Research Pilot School in 1971 and later served as an instructor pilot at the test pilot school. He served as a test pilot working with the Royal Air Force in the United Kingdom for 3 years. Blaha also has worked for the Assistant Chief of Staff, Studies and Analyses at USAF Headquarters in the Pentagon. He has logged 4,300 hours of flying time in 32 different aircraft.

JAMES F. BUCHLI, 43, colonel, USMC, is mission specialist one (MS-1). Although born in New Rockford, N.D., Buchli considers Fargo, N.D., his hometown. He is a member of the astronaut class of 1978.

Buchli was a mission specialist on STS 51-C launched on Jan. 24, 1985. The first Department of Defense mission included deployment of a modified inertial upper stage from the Space Shuttle Discovery.

He next flew Oct. 30, 1985, as a mission specialist on STS 61-A, the West German Spacelab D1 mission. That mission was the first to carry eight crewmembers, the largest crew to fly in space and the first in which payload activities were controlled from outside the United States. Buchli has logged a total of 243 hours in space.

He earned a B.S. degree in aeronautical engineering from the U.S. Naval Academy in 1967 and a M.S. degree in aeronautical engineering systems from the University of West Florida in 1975.

Following graduation from the U.S. Naval Academy and his commission in the USMC, Buchli served for 1 year in the Republic of Vietnam. He then completed naval flight officer training and was assigned to Marine fighter/attack squadrons in Hawaii, Japan and Thailand. He has logged 3,500 hours flying time, 3,300 hours in jet aircraft.

ROBERT C. SPRINGER, 46, colonel, USMC, is mission specialist two (MS-2). Although born in St. Louis, he considers Ashland, Ohio, his hometown. Springer is a member of the astronaut class of 1980 and will be making his first space flight.

He has worked in the Mission Control Center as a CAPCOM for seven flights and was responsible for Astronaut Office coordination of design requirements reviews and design certification reviews, part of the total recertification and reverification of the National Space Transportation System prior to STS-26's return to flight.

Springer earned a B.S. degree in naval science from the U.S. Naval Academy in 1964 and a M.S. in operations research and systems analysis from the U.S. Naval Postgraduate School in 1971.

After receiving a USMC commission, Springer received his aviator wings in August 1966 and was assigned to VMFA-513 at the Marine Corps Air Station in Cherry Point, N.C., where he flew F-4 aircraft. He then served in Southeast Asia where he flew F-4s and completed 300 combat missions. In June 1968, Springer served as an advisor to the Republic of Korea Marine Corps in Vietnam and flew 250 combat missions in 01 "Bird Dogs" and UH1 "Huey" helicopters.

Springer attended Navy Fighter Weapons School (Top Gun) and in 1975 graduated from the U.S. Navy Test Pilot School in Patuxent River, Md. He has served as a test pilot for more than 20 different fixed- and rotary-wing aircraft and performed the first flights in the AHIT helicopter. Springer has logged more than 3,500 hours flying time, including 3,000 hours in jet aircraft.

JAMES P. BAGIAN, M.D., 36, is mission specialist three (MS-3). This will be his first space flight. Born in Philadelphia, he is a member of the astronaut class of 1980.

Bagian participated in the planning and provision of emergency medical and rescue support for the first six Shuttle flights and has participated in the verification of Space Shuttle flight software. In 1986, Bagian became an investigator for the 51-L accident board and has been responsible for the development of the pressure suit and other crew survival equipment astronauts now use on Shuttle missions.

He earned a B.S. degree in mechanical engineering from Drexel University in 1973 and a doctorate in medicine from Thomas Jefferson University in 1977.

Bagian worked as a process engineer for the 3M Company in 1973 and later as a mechanical engineer at the U.S. Naval Air Test Center at Patuxent River, Md. He worked as a flight surgeon and research medical officer at the Johnson Space Center in 1978 while completing his studies at the USAF Flight Surgeons School and USAF School of Aerospace Medicine in San Antonio, Texas. An active participant in the mountain rescue community, Bagian has a private pilot's license and has logged more than 1,000 hours flying time in propeller and jet aircraft, helicopters and gliders.

SPACE SHUTTLE PROGRAM MANAGEMENT

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RADM Richard H. Truly	Associate Administrator for Space Flight
George W. S. Abbey	Deputy Associate Administrator for Space Flight
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Richard H. Kohrs	Deputy Director, NSTS Program (located at Johnson Space Center
Robert L. Crippen	Deputy Director, NSTS Operations (located at Kennedy Space Center)
David L. Winterhalter	Director, Systems Engineering and Analyses
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Robert M. Hornstein	Director, Ground Network Division

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Robert B. Sieck	Launch Director

George T. Sasseen	Shuttle Engineering Director
John J. Talone	STS-29 Flow Director
James A. Thomas	Director, Safety, Reliability and Quality Assurance
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Vaughn E. Turner	Chief, Communications Division
Dr. Dale W. Harris	TDRS Project Manager
Charles M. Hunter	TDRS Deputy Project Manager
Gary A. Morse	Network Director

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

February 23, 1989

N89-17

NOTE TO EDITORS/PROGRAM DIRECTORS

OMB DIRECTOR DARMAN TESTIFIES ON NASA BUDGET

On Feb. 22, 1989, Office of Management and Budget Director Richard Darman testified before the House Budget Committee. A transcript of his testimony concerning the NASA fiscal year 1990 budget is attached for your interest.

-end-

HOUSE BUDGET COMMITTEE HEARING
February 22, 1989

REP. JACK BUECHNER (R-MO.)
How many new program initiatives are in the FY 90 NASA budget?

RICHARD DARMAN:
I don't know the specific number of programs, but the budget calls for over a $2 billion increase over the FY 89 budget.

BUECHNER:
Well, I can tell you that there is only one new start, the CRAF/CASSINI. Would you agree with me in saying that the FY 90 budget for NASA is, with the exception of this one program, sufficient only to fund already existing programs?

DARMAN:
I do not have the specific figures in front of me.

BUECHNER:
I guess what I am getting at is that if reductions were made in the President's budget for NASA, they would be made at the expense of existing programs within NASA.

DARMAN:
I did look at ways to save money within the NASA budget, and I concluded that there were none. The only way to obtain significant dollar savings from the NASA budget would be to cut into the Space Station program, and stretch it out. That would be tantamount to killing it, and we don't want to do that.

BUECHNER:
Are you saying that from a budgetary standpoint, stretching out the funding for the Space Station does not make sense, that it would cost more in the long-term, etc.?

DARMAN:
One of the central priorities in our budget is to invest in the future. The space program is critical in this endeavor. If we left it to the political system, the funding for the future would not be adequate because the direct beneficiaries are not yet of voting age. We must push on to the new frontier. Investment in space is an investment in future benefits. It is good policy, and it is a good budget.

-more-

BUECHNER:
What impact would a cut in the Space Station budget have on our cooperative endeavors with other nations? Do you consider it a possibility that they would pull out?

DARMAN:
That could be a problem. I see a larger problem in that these countries would very likely go and pursue their own initiatives without the U.S. You can see Japan tempted in this direction, the Europeans have already launched vigorous programs of their own, and the Soviets have already established significant progress. It would be a tragedy if we were left behind. It is inconsistent with U.S. history to take a back seat in new technology, in exploring a new frontier. We should not allow this to happen.

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February 24, 1989

Jeffrey E. Carr
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RELEASE: 89-24

SPACE SHUTTLE CREW MEMBERS NAMED TO DOD, LIFE SCIENCES MISSIONS

NASA has named flight crew members to two Space Shuttle missions scheduled to fly in 1990.

USN Capt. John O. Creighton has been named to command shuttle mission STS-36, a Department of Defense-dedicated flight aboard Atlantis set for February 1990. USAF Col. John H. Casper will serve as pilot. Mission specialists are USMC Lt. Col. David C. Hilmers, USAF Col. Richard M. Mullane and USN Lt. Cmdr. Pierre J. Thuot.

Creighton has flown as pilot on mission STS-51G. He was born April 28, 1943, in Orange, Texas, but considers Seattle, Wash., to be his hometown.

Casper will be making his first space flight. He was born July 9, 1943, in Greenville, S.C.

Hilmers has flown as a mission specialist on STS- 51J and STS-26. He was born Jan. 28, 1950, in Clinton, Iowa, but considers DeWitt, Iowa, to be his hometown.

Mullane has flown as a mission specialist on two flights, STS-41D and STS-27. Mullane was born Sept. 10, 1945, in Wichita Falls, Texas, but considers Albuquerque, N.M., to be his hometown.

Thuot, making his first flight in space, was born May 19, 1955, in Groton, Conn., but considers Fairfax, Va., to be his hometown.

- more -

Two NASA astronauts also have been named as mission specialists aboard the Space Shuttle Columbia on mission STS-40. M. Rhea Seddon, M.D., and James P. Bagian, M.D., have been assigned to the space life sciences-dedicated mission, SLS-1, scheduled for launch in June 1990.

Seddon has flown on mission STS-51D as a mission specialist. She was born Nov. 8, 1947, in Murfreesboro, Tenn. Bagian currently is preparing for his first space flight aboard Discovery on mission STS-29 as a mission specialist. Bagian was born Feb. 22, 1952, in Philadelphia, Penn.

Additional SLS-1 crew members were named in April 1985. They are payload specialists F. Drew Gaffney, M.D., University of Texas Health Science Center, Dallas, and Robert W. Phillips, M.D., Colorado State University, Fort Collins.

The SLS-1 partial crew assignment will provide for long-range crew participation in payload training and integration. The remainder of the flight crew will be assigned later.

- end -

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Lyndon B. Johnson Space Center
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For Release

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February 28, 1989
Embargoed until 11 a.m. EST

Jerry Berg
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RELEASE: 89-25

SHUTTLE TILE DAMAGE STUDY COMPLETED; "GO" FOR DISCOVERY FLIGHT

A NASA review panel, investigating the damage to the orbiter Atlantis' thermal protection system during the STS-27 mission, found that the most probable cause was ablative insulating material from the righthand solid rocket booster nose cap dislodging and striking the orbiter about 85 seconds into flight.

The Shuttle was traveling at approximately two and one-half times the speed of sound. At that speed, tests and analyses have demonstrated that material breaking away from forward portions of the vehicle can result in debris striking the orbiter with enough force to damage the tiles.

Following its landing on Dec. 6, 1988, inspection revealed that Atlantis had sustained slightly more than 700 individual tile impacts. The damage was concentrated on the lower surface tiles of the righthand side. One complete tile was found missing from the damaged area below the crew compartment, and an insulation panel was missing from the right orbital maneuvering system (OMS) pod.

In its effort to understand how the damage occurred, the review team gathered extensive physical evidence by examining the Atlantis vehicle, reviewing prelaunch inspection records and procedures, assessing tracking camera footage and interviewing Atlantis' flight crew. They studied the flight hardware design and build records and conducted laboratory tests on the damaged tiles, looking for bits of the damaging debris material.

In addition to such tests and analyses, the finding concerning the most probable cause was based on:

o A determination that several manufacturing process variables on the right booster nose cap were very near their specification limits; and,

o The discovery of minute bits of the booster nose cap insulation material and paint embedded in the damaged tiles and OMS pod blankets.

The review team also reported that debris from other sources, including repaired external tank insulation and cork material covering the solid rocket motor joints, may have caused minor tile damage.

The team's findings do not pose any constraint for launching Discovery on the STS-29 mission, according to the report. A major reason for concluding that the STS-29 hardware is ready to fly stems from an improvement made to the suspect insulating material covering the booster nose caps.

The suspect material, known as Marshall Sprayable Ablator (MSA), was used in its original formulation for nose caps up to and including the STS-27 mission. Following fabrication of the STS-27 nose caps, changes were made in the material's properties, manufacturing process and application. The result was an improved product designated MSA-2. The changes have been shown to produce stronger bonds between the insulating material and the surface on which it is applied.

The first boosters to be fabricated with the improved material are those for the upcoming STS-29 flight. This new material recently was subjected to additional strength tests, called "pull tests," and successful completion of those tests has further bolstered confidence that the material will perform successfully.

Despite the team's belief that the change in nose cap insulation material will prevent severe tile damage in the future, the report recommended several other steps toward further understanding and to minimize minor damaging debris on future flights. The recommended steps include:

o Expanding an existing operations team to monitor and report on this critical area for all future flights;

o Selectively performing the pull tests on SRB nose cap insulation material prior to future flights;

-more-

o Inspecting the joint cork material which externally covers solid rocket motor field joints to make sure there are no low density inclusions in the material (such inclusions, if found, normally are repairable);

o Reviewing design criteria and searching for process enhancements to further minimize debris potential; and,

o Assigning more data-gathering sources, such as additional cameras, for future flights. If and when tile damage does occur, such additional sources would yield more data and other evidence, thus providing a better basis for establishing the causes.

The review panel was chaired by John W. Thomas of Marshall Space Flight Center. Other members include Jay Honeycutt of the NSTS Program Office, NASA Headquarters (alternate chairman); Jack Nichols, James Earle, James Hester, Keith Henson and Dewey Channell of the Marshall Space Flight Center; Marion Coody, Robert White, Gary Coen and Don McMonagle of the Johnson Space Center; and Charles Stevenson and Judith Kersey of the Kennedy Space Center.

- end -

NASA News

National Aeronautics and
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For Release:
March 2, 1989

RELEASE: 89-27

CONTRACTS AWARDED FOR ADVANCED LAUNCH SYSTEM ADVANCED DEVELOPMENT PROPULSION

As part of the DOD/NASA Advanced Launch System (ALS) program, NASA's Marshall Space Flight Center, Huntsville, Ala., today announced the selection of three firms for negotiations leading to award of five contracts for propulsion advanced development efforts to demonstrate and mature new propulsion technologies.

The objective of these ALS propulsion advanced development efforts is to demonstrate highly reliable, low-cost engine components for the liquid-fueled engines. This effort will focus on integration of innovative, simplified designs, materials, fabrication processes and producibility features in large-scale components to establish first-unit cost to verify the production-cost model.

The propulsion system components include the turbomachinery for liquid oxygen, liquid hydrogen and liquid methane propellants, the propellant control effector system and the engine controller system.

Contracts will be awarded to Aerojet General Corp, Sacramento, Calif.; Rocketdyne Division, Rockwell International, Canoga Park, Calif.; and United Technology Corp., Pratt and Whitney Division, West Palm Beach, Fla. Under separate contracts, Aerojet will provide a liquid hydrogen turbopump, Rocketdyne will provide a liquid methane turbopump, and Pratt and Whitney will provide a liquid oxygen turbopump for the ALS. Each of these contracts, including options, is valued at approximately $23 million.

- more -

An additional two contracts will be awarded to Aerojet, one valued at approximately $4 million to provide an engine propellant control effector system and a second contract valued at approximately $3 million to provide an engine controller system.

The contracts require that component hardware should provide high reliability with significant cost advantages over existing components in terms of first-unit cost, average-unit production cost and operational cost, including simplified test and launch site maintenance. Integration of the technology into components that are major cost drivers for liquid engines must demonstrate the cost performance and reliability of the new, innovative approaches.

These contracted efforts being announced today will be closely coordinated with the ongoing concept definitions studies and planned Phase-B systems definition studies of the Space Transportation Main Engine (STME) and the Space Transportation Booster Engine (STBE). The STME is a gas-generator cycle engine using liquid oxygen and liquid hydrogen propellants, having a vacuum thrust level of 580,000 lbs. The STBE is a gas generator cycle engine, using liquid oxygen and liquid methane propellants, having a sea level thrust of 750,000 lbs.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

Barbara Selby
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

For Release March 3, 1989

N89-19

EDITORS NOTE: NASA SETS LAUNCH DATE FOR NEXT SHUTTLE MISSION

Admiral Richard H. Truly, NASA associate administrator for space flight, today set a launch date of March 11, 1989 for STS-29, a mission aboard the orbiter Discovery, to launch NASA's Tracking and Data Relay Satellite (TDRS-D). The announcement followed a comprehensive 2-day flight readiness review, assessing all Shuttle program elements, held at the Kennedy Space Center, Fla..

At the conclusion of the meeting, Admiral Truly said, "The flight readiness review clearly demonstrated that the ongoing efforts of all members of our Shuttle team have resulted in another good report on the Shuttle system. I'd especially like to commend all those involved in the recent main engine turbopump changeout activity, which involved many individuals from our NASA and contractor teams. They did a great job. As it now stands, our launch teams are not working any significant issues which are expected to impact a launch next week."

The STS-29 launch window begins at 8:10 a.m. and runs through 10:40 a.m.. The crew is Michael L. Coats, commander; John E. Blaha, pilot; and James F. Buchli, Robert C. Springer and James P. Bagian, mission specialists.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Sarah Keegan
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

March 6, 1989

N89-19

NOTE TO EDITORS:

REVISED LAUNCH DATE FOR STS-29

The launch of the Space Shuttle Discovery (STS-29) has been delayed at least 2 days beyond the scheduled March 11 lift-off, NASA announced today. The delay was caused by the failure of one of Discovery's master event controllers (MEC) when it was powered up last night.

The MEC sends signals to fire the pyrotechnics, permitting the separation of the solid rocket boosters and the external tank and intitiates a number of other sequencing commands. The signal paths used for these critical commands were being checked last night, as part of final ordnance activities, when the problem was discovered.

Workers at Kennedy Space Center will replace the unit, located in the orbiter's aft compartment. Vehicle ordnance devices must be disconnected for the removal of the old MEC and installation and testing of a replacement MEC. An exact launch date will not be known until the testing of the new MEC has been completed.

- end -

NASA News

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Washington, D.C. 20546
AC 202-453-8400

Debra J. Rahn
Headquarters, Washington, D.C.
(Phone: 202/453-8455)

For Release:
March 9, 1989

RELEASE: 89-28

U.S./USSR TO IMPLEMENT MEDICAL COMMUNICATIONS SATELLITE LINK

Representatives from NASA and the USSR Ministry of Health agreed today in Moscow to make U.S. medical expertise available to the Soviet Union in response to long-term medical problems arising from the December 1988 earthquake in Armenia.

The earthquake leveled several cities and towns, and the resulting injuries strained medical resources. NASA proposed combining its expertise in satellite communications with the unusual medical care capabilities required by space flight to provide a resource that may help solve medical problems in the aftermath of the earthquake.

The proposed "telemedic spacebridge" demonstration will address the longer-term consequences of the disaster and is planned for a period of several months. It will provide medical consultation to support rehabilitation, reconstructive surgery, physical therapy, public health and psychological counseling.

Many of these services involve skills concentrated in specialized facilities such as Uniformed Services University of the Health Sciences, Bethesda, Md.; University of Maryland, Maryland Institute For Emergency Medical Services System, Baltimore; University of Texas Health Science Center, Houston; and LDS Hospital, University of Utah, Salt Lake City.

Under the plan, U.S. medical facilities would be linked by satellite with Soviet hospitals and rehabilitation centers. Comsat Corporation and Intelsat, both in Washington, D.C., have offered to provide satellite transponder time free of charge. NASA will provide a compatible satellite ground terminal to be installed in Armenia. The link would provide one-way television and two-way voice capabilities for several hours a day, 2 days a week. The link is scheduled to begin operation this spring.

- more -

Professor Alexander A. Kiselev, Director General of the Scientific Production Asso. (NPO) SOYUZMEDINFORM, Ministry of Public Health of the USSR, said "Fifteen years of joint experience in space make it possible to deliver the capability promised by outer space medicine for the benefit of practical health care with a number of interested establishments in the Soviet Union involved in the program."

While the communications would be directly between hospitals in the U.S. and the USSR, NASA also would provide a small project management center at NASA's Goddard Space Flight Center, Greenbelt, Md., staffed with communications and medical personnel to assure proper functioning of the link.

A NASA program for cooperation with the Soviet Union already exists under the 1987 agreement between the United States and the Union of Soviet Socialist Republics concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes. The telemedicine spacebridge would be coordinated under the auspices of the U.S.-USSR Joint Working Group on Space Biology and Medicine, one of five joint working groups established by the agreement.

- end -

National Aeronautics and
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Washington, D.C. 20546
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For Release:

Jim Cast
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

March 9, 1989

Jim Elliott
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-6256)

RELEASE: 89-29

NASA GODDARD CENTER REQUESTS COMMERCIAL LAUNCH SERVICES PROPOSALS

NASA's Goddard Space Flight Center, Greenbelt, Md., has requested proposals from commercial sources to launch three identified satellites and options for NASA to order up to 12 additional launches, if exercised, over the next 5 years.

The three identified satellites for which launch services would be be procurred under the request for proposals (RFP) are the Wind, Geotail and Polar satellites of the International Solar Terrestrial Physics Projects. Their launches are scheduled in 1992 and 1993.

The RFP calls for 5 of the 15 launches to be high inclination (polar) launches and the other 10 to be low inclination (equatorial). Polar launches normally are conducted from the West Coast and equatorial from the East Coast.

Under the agreement, the contractor would furnish all supplies, including the launch vehicle, facilities, personnel, and services necessary to design, produce, test, integrate and launch the missions into the required orbit.

The Orbital Launch Systems Project Office at Goddard will oversee the contractor activities provided under this contract. Proposals from commercial interests are to be submitted by May 8.

-end-

EDITOR NOTE: Copies of the RFP are available for viewing in the newsrooms at Goddard and NASA Headquarters.

NASA News

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Joyce B. Milliner
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For Release:
March 10, 1989

RELEASE: 89-30

ARTIFICIAL CLOUDS TO BE VISIBLE IN CANADA AND U.S.

Four suborbital rockets, two Black Brant Xs and two Nike-Orions, are scheduled to be launched from Canada during the next few weeks as part of a major NASA sounding rocket campaign.

Two of the rocketborne scientific experiments, programmed to create artificial clouds at high altitudes over Canada, are scheduled for launch during late March from Canada's Churchill Research Range on Hudson Bay. These colorful barium releases will be visible, cloud cover permitting, to residents in Central and Eastern Canada and in North-central United States, according to the experimenters.

The other two rockets, carrying upper atmosphere experiments which will not be visible to residents, are scheduled to be launched between March 16 and March 24.

The objective of the barium release payloads is to measure electric fields aligned with the Earth's magnetic field. Such fields are thought to be responsible for accelerating electrons to create aurora but their locations and strengths have not been well established by measurements. Using the barium ions as optical tracers, the electric fields are measured by observing how the motion of the barium ions deviates from the predictable motion that comes from the initial injection velocity and gravitational and "magnetic mirror" forces.

The launch window period is March 25 through April 11 with launch opportunities each day in the late evening and early morning. If required, there is a second launch window in late April through early May. Clear weather conditions are required at the ground observing sites.

- more -

Three-stage Black Brant X suborbital rockets will be used to loft the barium payloads. The Black Brant XB is a solid-propellant rocket about 48 feet long and 18 inches in diameter.

There will be two barium releases from each rocket payload, one before and one after apogee. The two explosive releases will occur from each payload at altitudes of 483 and 555 miles over the center of Hudson Bay.

The time of the launches is selected so the releases occur either in the post-twilight or pre-dawn period when the payloads are in sunlight but observers on the ground are in darkness. Project officials expect them to be visible as far away as Chicago.

Following each release, the barium is quickly ionized (becomes electrically charged) by the sunlight. The ejected barium first appears greenish-white in color, becomes yellowish and then turns to a purplish hue. The newly-created barium ions spiral around magnetic field lines and rapidly move along the magnetic field lines away from the Earth.

Each release will produce two luminous streaks of barium ions which absorb and re-emit sunlight. One is a "pencil like" beam of ions that will travel rapidly to altitudes greater than 12,425 miles above the Earth's surface. The other streak does not have the high velocity of the first and will rise to altitudes of only 1243 to 1864 miles . The fast, high altitude streak probably will not be visible to the naked eye after about 5 minutes. The lower altitude low velocity streak will remain visible for 20 or more minutes.

The "pencil-like" beams of barium ions will be tracked by electronic intensified cameras from sites located at Churchill and Gillam, Canada, and Los Alamos, N.M,; Houston; Richmond Hill, Pa.; and Millstone Hill, Mass. Scanning photometers will observe from Calgary, Canada, and from Richland, Wash.; Seeley Lake, Mont.; Boulder, Colo.; and Channing, Mich.

The U.S. observing teams come from the Goddard Space Flight Center, Johnson Space Center, Los Alamos National Laboratory, Battelle Pacific Northwest Laboratory, Naval Research Laboratory, Technology International Corp., University of Alaska, Boston University, plus a team from University College, London.

In the other two missions of the 1989 campaign, Nike-Orion rockets will carry a cryogenic whole-air sampler (CWAS) payload weighing over 400 pounds into the upper stratosphere to study the polar ozone problem and the greenhouse effect.

The CWAS payload was developed by the University of Pittsburgh for NASA's Upper Atmosphere Research Program to investigate the sources and losses of carbon dioxide, Nitrous Oxide, Nitric Oxide and Methane and other trace constituents that play a role in the ozone chemistry of the middle atmosphere over an altitude range of 19-47 miles. The payload also will provide an accurate technique for calibrating UARS, a remote-sensing satellite scheduled to be launched by NASA from the Shuttle during September 1991.

The CWAS experiments are part of a major NASA effort to study the chemistry of the lower atmosphere at northern latitudes. These launches will complement the extensive aircraft and ground-based observations by NASA's polar expedition to Norway this winter.

The CWAS payload measures the density and altitude distribution of the major and minor chemical species in air. This objective is accomplished by collecting large whole-air samples during the upleg portion of the flight, returning them to the Earth by parachute and ultimately analyzing the samples at the University of Pittsburgh. A novel refrigeration technique is used to freeze the air entering the payload in specially-prepared collection cells kept at -436 degrees F. during flight.

W. A. Brence, Wallops Flight Facility (WFF), is the NASA campaign manager. Dr. Robert Hoffman, NASA Goddard Space Flight Center, Greenbelt, Md.,is the principal investigator for the two Black Brant X launches, and Dave Kotsifakis is the NASA WFF payload manager. Dr. Edward C. Zipf, University of Pittsburgh, is the principal investigator for the two Nike-Orion launches. Bruce Scott is the NASA WFF payload manger.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
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Headquarters, Washington, D.C.
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James Hartsfield
Johnson Space Center, Houston
(Phone: 713/483-5111)

For Release:
March 14, 1989

N89-23

NOTE TO EDITORS: STS-29 EARTH OBSERVATIONS BRIEFING SCHEDULED

A press briefing on astronaut Earth observations photography during Space Shuttle mission STS-29 has been planned for 3 p.m. EST, Wed., March 15 (flight day 3). The briefing will be held in addition to regularly scheduled mission briefings, originating from the Johnson Space Center (JSC), Houston.

The briefing will be presented by Dr. Charles A. Wood, manager of the JSC Space Shuttle Earth Observations Office, and Kamlesh P. Lulla, lead Earth observations scientist for STS-29.

The briefing will be carried live on NASA Select television. Newsrooms at NASA field centers and at Headquarters, Washington, D.C., will be able to participate in the question and answer session.

- end -

NASA News

National Aeronautics and Space Administration

Washington, D.C. 20546
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For Release:
March 14, 1989

RELEASE: 89-31

DISCOVERY'S RETURN-TO-FLIGHT PHOTOGRAPHS RECORD MANY FIRSTS

Earth observation photographs taken by Discovery's crew during America's return to piloted space flight in 1988 were among the clearest in more than 20 years, and they captured a variety of environmental conditions.

Included in the astronauts' photography from the September 1988 mission is a photograph showing at least a 1 million square-mile smoke cloud over South America's Amazon River basin and, in Africa, evidence of flooding in areas that have experienced a lengthy drought.

Due to an unexpected improvement in atmospheric clarity over the Northern Hemisphere, the Discovery crew could distinguish ground details about 700 miles away from their spacecraft, much farther than has been normal for Space Shuttle flights. Visibility over the Northern Hemisphere during STS-26 was the best since the 1960s Gemini Program flights.

In total, the crew took 1,505 photographs of Earth during the 4-day mission. Discovery was launched into an orbit that kept it above only the tropical and subtropical regions of Earth. That orbit took the spacecraft over about half of Earth's surface, covering parts of 122 nations and regions that hold about 75 percent of the world's population.

Photographs show a dense, white smoke cloud, the result of tropical forest, pasture and croplands being cleared and burned, completely obscuring the ground over much of South America's Amazon River basin. If placed over the United States, the same cloud would cover an area of more than one-third the contiguous 48 states.

- more -

It is the largest and thickest accumulation of smoke ever photographed by astronauts, much larger than the previous largest smoke cloud photographed by astronauts over the same region in 1984.

STS-26 also photographed smoke clouds over Sumatra and Borneo, Indonesia, Madagascar, eastern Africa, northern Australia and Bolivia. Some photographs show apparent irrigation features in the tropics -- in areas that normally receive 100 inches of annual rainfall.

In Africa, the "green line" of vegetation that generally marks the southern boundary of the Sahara Desert had moved the farthest north it has been in astronaut photography since 1965. Also, standing water was photographed in the Sahara.

For the first time in Shuttle history, Africa's Niger river was photographed in full flood and out of its banks. Photographs of the Blue and White Nile rivers also showed evidence of recent flooding.

Throughout eastern Africa, the landscape was tinted with green, a condition never before seen in this region during the Shuttle program. Still, Africa's Lake Chad and Lake Nasser, two lakes that have long been studied by space photography, were at the lowest levels ever photographed by astronauts. Since 1960, Lake Chad's surface area is estimated to have declined by more than 90 percent.

The extreme atmospheric clarity over the Northern Hemisphere during the mission was due, at least in part, to the absence of major global duststorms. Duststorms of million-square mile dimensions over northern Africa, even extending halfway across the Atlantic Ocean, were photographed during 1984 and 1985 Shuttle flights. But no such African duststorms were seen during STS-26, nor were major duststorms observed elsewhere.

A lack of recent major volcanic eruptions, which cause dust in the upper atmosphere, also may have contributed to the extreme clarity.

As a result, the STS-26 photographs captured details not usually seen in Shuttle photography: for the first time, an aircraft was photographed generating a contrail; individual buildings could be seen in the Canary Islands; a line of electrical transmission pylons was seen in southern Sudan; and oil platform flares were seen in the Gulf of Campeche. STS-26 also photographed the effects of Hurricane Gilbert on the Mexican Gulf Coast and five volcanoes with signs of eruptive activity.

- more

Earth photography from the Space Shuttle is managed by the Space Shuttle Earth Observations Office at the Johnson Space Center. The office trains Shuttle crews in Earth photography, selects targets for photography for each mission and analyzes the resulting photographs. In addition, research is conducted by specialists in environmental sciences, biology, climatology, geology and other fields using data obtained with Shuttle photography.

- end -

Photographs to illustrate this story can be obtained by calling 202/453-8375.

Color Photographs: 89-HC-138 thru 89-HC-150

NASA News

National Aeronautics and Space Administration

Washington, D.C. 20546
AC 202-453-8400

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For Release:
March 14, 1989
5:15 P.M. EST

RELEASE: 89-32

NASA AND JAPAN SIGN SPACE STATION MEMORANDUM OF UNDERSTANDING

NASA Administrator Dr. James C. Fletcher and the Ambassador of Japan to the United States H. E. Nobuo Matsunaga today signed the memorandum of understanding (MOU) between the U.S. National Aeronautics and Space Administration and the government of Japan on cooperation in the detailed design, development, operation and utilization of the permanently-inhabited, civil space station, which the U.S. calls Freedom. The agreement was signed at a brief ceremony at NASA Headquarters, Washington, D.C.

Comparable MOUs with the European Space Agency and Canada were signed, along with an inter-governmental agreement, in a ceremony held at the U.S. State Department last September. The MOUs signed between NASA and its three partners focus on programmatic and technical aspects of the cooperative effort and establish the management mechanisms necessary to carry out the Freedom program.

The MOU with Japan will enter into force upon written notification by each party that all procedures necessary for its entry into force have been completed. Until then, Japan will continue to work under an extension of the MOU signed with NASA in May 1985 at the start of the space station program's definition and preliminary design phase.

Under the agreements, Japan will provide the Japanese Experiment Module (JEM) to the Freedom program. The JEM, to be permanently attached to the space station base, consists of a pressurized laboratory module, at least two experiment logistics modules and an exposed facility, which will allow experiments to be exposed to the space environment.

- more -

Experimenters will conduct materials processing and life sciences research in the laboratory module, while the logistics module can be used to ferry materials between the station and Earth and for storing experimental specimens and various gases and consumables.

Space Station Freedom is an international space complex comprising a permanently-inhabited base and unmanned scientific platforms to be placed into orbit in the mid 1990's. The mission of the Freedom program is to provide for the United States and its international partners -- Canada, Japan and 9 European nations -- a diverse set of capabilities permitting humans to live and work in space for extended periods of time.

The station will enable fundamental research in materials and life sciences, support observations of the Earth, its solar system and the universe and provide the on-orbit test bed for the development of advanced technologies necessary for human exploration of the solar system.

- end -

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Charles Redmond
NASA Headquarters, Washington, D.C.
(Phone: 202/453-1549)

March 15, 1989

Mary Hardin
Jet Propulsion Laboratory, Pasadena, Calif.
(Phone: 818/354-5011)

RELEASE: 89-33

NEW EARTHQUAKE FAULTS DISCOVERED WITH LANDSAT IMAGES

Several previously unknown geological faults, some of which may be active, have been discovered in the central and eastern Mojave Desert in California by geologists at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., and Louisiana State University analyzing images from an Earth-orbiting Landsat satellite.

The strike-slip faults were identified by images taken by the Thematic Mapper (TM) instrument on Landsat 5, which obtains images simultaneously in seven bands at optical and infrared wavelengths. Scientists used the TM images as a "map" which pointed them in the right direction to locate and confirm the faults in the field.

JPL's Dr. John Ford, who helped locate and verify the faults in the field, said that "without Thematic Mapper images we would not have found the faults and TM images may enable us to find many more unmapped faults in the Mojave."

The newly observed faults are located in and near the unpopulated Bristol Mountains and Cady Mountains. Scientists have determined that the faults in the Bristol Mountains are overlain by unconsolidated alluvial fan debris (gravel) and are probably inactive. In contrast, faults lying to the west (Cady Mountains) cut all deposits and are seismically active. The faults all form part of a complex regional network of right-slip faults that run between the Death Valley region and the San Andreas Fault System.

-more-

The newly observed faults are much smaller and less active than the San Andreas Fault but they all show evidence of a strike slip, Ford said. During an earthquake, movement on a strike-slip fault is dominantly horizontal and parallel to the trend of the fault. Scientists are now trying to determine how the newly observed faults fit into the regional structure in this part of the Earth's crust.

The faults add new pieces to the geological puzzle of how the Death Valley Fault zone and the San Andreas Fault system are related in space and time. The presence of these newly observed faults indicates that there are other yet-to-be discovered faults in the area.

The research is being conducted by geologists, Dr. John P. Ford, Dr. Robert E. Crippen and Dr. Ronald G. Blom of JPL and Professor Roy K. Dokka of the Department of Geology and Geophysics, Louisiana State University.

The project is funded by NASA's Land Processes Branch of the Office of Space Science and Applications, Washington, D.C.

-end-

NASA News

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For Release:

David Garrett
Headquarters, Washington, D.C.
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March 16, 1989

N89-24

NOTE TO EDITORS:

TRANSCRIPT OF CALL BY PRESIDENT BUSH TO SHUTTLE ASTRONAUTS

The following is a transcript of the conversation between President George Bush and the STS-29 Space Shuttle mission astronauts. The conversation began at approximately 8:20 a.m. EST today.

The astronauts are Navy Capt. Michael Coats, mission commander; Air Force Col. John Blaha, pilot; and mission specialists Marine Col. James Buchli, Marine Col. Robert Springer and James Bagian, M.D.

The President (addressing Capt. Coats): How are you, sir? We just called up to congratulate you and your crew on the Space Shuttle Discovery. Sitting next to me is our Vice President, who is now head of the Space Council and who, incidentally, will be down in Houston in just about two weeks. But what I really wanted to do is congratulate you and then hear about how things are going. We're certainly proud of the mission.

Astronaut Coats: (Sound difficulties)...on the ground have worked very hard to get this flight off - the first one of your presidency and the first one of very many to come.

The President: Well, it's certainly wonderful. Looks to me like you made that crew clean up. I'm watching you. I can see you, sitting here in the Oval Office - amazing technology. And there are five of you sitting there and looking pretty clean and pretty fresh. How is everyone feeling on the flight?

-more-

Astronaut Blaha: Well, we're all feeling very well, Mr. President. It's been an exciting time. Of course, three of us on the flight are rookies in space and I think the cleanliness and the smiles that you see are just a reflection of the fun that goes along with the hard work. We're doing an awful lot of good things but we're really enjoying what we're doing.

The President: Well, we are following it carefully and I'm glad that the TDRSS satellite was a successful operation there. And how's the camera? How's that IMAX camera going to be?

Astronaut Springer: The IMAX camera has been working out really well, sir. In fact, we're getting a lot of great film that will help show a lot of people around the world how fragile the planet Earth is in this big vastness of space and maybe help everybody work to improve that.

The President: Well, it's a good focus, and there's just so much interest today on the global environment. And I think alot of people will see just from your important mission the contribution space exploration can make to the world environment. So we're very grateful on that. A couple of more questions about -- I was interested because of the history of this -- about the student experiments and how that is going.

Astronaut Bagian: Well, Mr. President, the student experiments are going very well. Both of them were pretty well thought out....and they've been going just as we expected. Both John Blaha and myself have been looking in on those two experiments, and the data is looking very good. And I think the students will have a lot of good information to get out of it when we get back.

The President: Well, it's an inspiration to Americans -- I'll tell you to all of us -- that today's pioneers (and we're seeing you right now) pointing the way for the young Americans to build our nation's future. Listen, all of you down there at NASA, I heard what Mike said. And let me just -- while we're on the air to space -- let me simply say to everyone at NASA that you have our strong suport. I know I speak for the Vice President. The space program, especially Space Station Freedom, is an investment in our future. We're living in tough budgetary times, but I am determined to go forward with a strong, active space program. And I want to congratulate you, Commander Coats, and all of them for this wonderful mission. We look forward to your safe return, and I think it's wonderful that two Marines can get along with a guy from the Navy and the Air Force and a civilian. That shows a broad-minded approach to life in space. Did you read that?

Astronaut Buchli: Yes sir, we did. Obviously, the Marines can get along with the services. But, just in case, we have them outnumbered. There's two of us on board.

The President: I got the message. Sorry to start it going up there. But listen, congratulations -- congratulations to you and best wishes. And you've been an inspiration to all of us. So long and God bless.

Astronaut Coats: Thank you Mr. President, and give our regards to Mrs. Bush. Tell her we're flying something for the new first lady.

The President: OK. She'll be thrilled. Well, you'd better come up here and give it to her personally.

Astronaut Coats: That would be nice, sir.

The President: You're in -- you're invited right as of now. So when you get back, why, head this way. Over and out.

Astronaut Coats: Yes sir, have a good day.

The President: All at NASA, many, many thanks, keep up the great work.

- end -

NASA News

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Dwayne C. Brown
Headquarters, Washington, D.C.
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For Release:

March 16, 1989

N89-25
NOTE TO EDITORS:

AEROSPACE SAFETY ADVISORY PANEL MEETING RESCHEDULED

The Aerospace Safety Advisory Panel's (ASAP) meeting with NASA Administrator Dr. James C. Fletcher slated for March 20, 1989, has been rescheduled.

Dr. Fletcher will meet with the ASAP on Tues. March 28, 1989, in room 7002, 400 Maryland Ave. S.W. at 2:00 p.m EST. The ASAP report will be distributed at this meeting.

-end-

NASA News

National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058
AC 713 483-5111

For Release

Steve Nesbitt — IMMEDIATE
RELEASE NO. 89-012 — March 17, 1989

NOTE TO EDITORS: CREW CONFERENCES, STS-30 BRIEFINGS SET

The astronaut crew press conference and background briefings for the STS-30 Space Shuttle mission will be held March 27, 1989, at the NASA Johnson Space Center in Houston.

Briefings are scheduled to begin at noon CST with a mission overview followed by sessions on the Magellan spacecraft and other experiments.

The STS-29 crew post-flight press conference will be at 2 p.m. CST Tuesday, March 28.

All briefings will be held in Room 135, Bldg. 2 at JSC. They will be carried on NASA Select Television which is accessible on RCA Satcom F2R, transponder 13. The frequency is 3960 MHz with a look angle of 72 degrees west longitude.

# # #

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Terri Sindelar
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

March 20, 1989
2 p.m. EST

Jay P. Goldman
Council of Chief State School Officers, Washington, D.C.
(Phone: 202/393-8161)

RELEASE: 89-34

SHUTTLE ORBITER-NAMING COMPETITION STATE-LEVEL WINNERS ANNOUNCED

NASA, in cooperation with the Council of Chief State School Officers (CCSSO), today announced the state-level winners in the national student competition to name NASA's replacement Space Shuttle orbiter.

Over 71,650 U.S. students formed some 6,100 teams, each led by a school faculty member in kindergarten through 12th grade, and prepared and submitted educational research projects to support and justify the orbiter name submitted. The name proposed had to be that of a sea vessel used in research or exploration. The interdisciplinary classroom projects were completed during the 1988 fall semester and entries were submitted by Dec. 31, 1988.

The classroom projects were reviewed by panels selected by state education agencies in all 50 states, the District of Columbia, four U.S. territories, the Bureau of Indian Affairs, the Department of Defense and the Department of State schools. Winners were selected from two divisions, kindergarten through grade 6 and grades 7 through 12.

The state-level winning projects will be reviewed by a NASA panel. The final winner from each division and the name selected for the orbiter will be announced in early May.

Each participant will receive recognition for the team's entry. The state-level winners will receive special recognition from the NASA field centers. NASA's Educational Affairs Division will conduct special programs at the two national-winning team schools. In addition, up to nine students and the team coordinator may represent each of the two national winners to receive an expense-paid visit to a NASA educational event.

- more -

House Joint Resolution 559, introduced March 10, 1986, by Congressman Tom Lewis (R-Florida), called for the name of the replacement orbiter to be selected from suggestions submitted by students.

The new orbiter, currently designated OV-105, is being built by Rockwell International to replace the Space Shuttle orbiter lost in the Challenger accident. OV-105 is scheduled to be completed in 1991.

- end -

EDITORS NOTE:

A listing of state-level winners is available in the NASA Headquarters Newsroom, 400 Maryland Ave., S.W., Washington, D.C. (Phone: 202/453-8400).

NASA

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AC 202-453-8400

For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

March 21, 1989

Nancy Lovato
Ames-Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE: 89-35

NASA COMPLETES ADVANCED WING FLIGHT PROGRAM, PLANS SYMPOSIUM

NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., has successfully completed flight tests of the Mission Adaptive Wing, flown on the Advanced Fighter Technology Integration F-111 aircraft.

For the Mission Adaptive Wing program, the F-111's wing was modified so that the curvature of the leading and trailing edges could be varied in flight. The airplane then could fly with optimum wing curvature for subsonic, transonic and supersonic speeds, offering the potential for greater flight efficiency.

Reductions in air drag from 8 to 20 percent were noted during the tests, as was a 20-percent reduction in wing bending during maneuvers. The airplane's handling qualities improved, with a significant delay in the onset of buffet around the wing.

During the final phase of the flight program, the wing system was evaluated in its automatic modes. Computer programs directed the system to adjust for optimum wing performance based on pilot inputs and other instrumentation information.

The Mission Adaptive Wing system performed reliably, with no in-flight failures during 144.9 flight hours. Four NASA and six Air Force test pilots flew the aircraft during the final phase for a total of 59 flights.

The prime objective of the program was to evaluate performance improvements created by the smooth, variable-camber Mission Adaptive Wing as compared to a fixed-camber wing.

- more -

"The performance of the wing showed improvements as predicted," says NASA Project Manager Louis L. Steers. "We'll be able to pass on our results to aircraft designers and the data should help with their future designs."

The program is a joint effort by NASA Ames-Dryden and the Air Force Wright Research and Development Center, Wright-Patterson Air Force Base, Ohio, with the Air Force Flight Test Center, Edwards Air Force Base, Calif., as a participating test organization. Boeing Advanced Systems, Seattle, Wash., built the Mission Adaptive Wing system.

NASA and the USAF Wright Research and Development Center will co-host a symposium to present program results on April 4-6, 1989, at the Ames-Dryden Flight Research Facility. Attendance at the symposium is limited to U.S. government agencies and their contractors. Those interested should contact Louis L. Steers, NASA Ames-Dryden Flight Research Facility, Edwards, Calif., 93523

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

March 21, 1989
2:00 p.m. EST

RELEASE: 89-36

NASA ADMINISTRATOR FLETCHER RESIGNS

NASA Administrator Dr. James C. Fletcher submitted his resignation today to President Bush, effective April 8, 1989.

Fletcher, who was brought back for a second term as administrator after the Challenger accident, says that with the successful conclusion of the third post-Challenger Space Shuttle mission, he feels that he can safely place the leadership of NASA in another's hands.

The letter to the president pledges to continue to work with his successor when appropriate. Fletcher said, "It has been a pleasure to serve you, both in your capacity as vice-president and in recent weeks as president. I look forward to an eminently successful Bush presidency."

Fletcher first served as NASA administrator from April 1971 to May 1977. He was called back by President Reagan in May 1986 with a mandate to get the Space Shuttle flying again safely. By virtue of the two terms, Fletcher has served as NASA administrator longer than anyone.

Effective April 8, Deputy Administrator Dale Myers will become acting administrator pending a new presidential appointment.

-end-

NASA News

National Aeronautics and
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Johnson Space Center, Houston
(Phone: 713/483-5111)

For Release:
March 21, 1989

N89-26

EDITORS NOTE: SPACE SHUTTLE CREW PRESS CONFERENCES SLATED

The astronaut crew press conference and background briefings for the STS-30 Space Shuttle mission will be held Monday, March 27, 1989, at the NASA Johnson Space Center, Houston. Briefings are scheduled to begin at 1 p.m. EST with a mission overview followed by sessions on the Magellan spacecraft and other experiments.

The STS-29 crew post-flight press conference will be at 3 p.m. EST, Tuesday, March 28.

All briefings will be held in Room 135, Bldg. 2 at JSC. They will be carried on NASA Select television which is accessible on RCA Satcom F2R, transponder 13. The frequency is 3960 MHz with a look angle of 72 degrees west longitude.

Newsrooms at NASA field centers and at Headquarters, Washington, D.C., will be able to participate in the conferences and the question and answer sessions.

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Sarah Keegan
Headquarters, Washington, D.C.
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March 21, 1989

Jerry Berg
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/544-0034)

RELEASE: 89-37

ENVIRONMENTAL IMPACT STATEMENT FOR ASRM ISSUED

NASA has issued the final environmental impact statement for the planned Advanced Solid Rocket Motor (ASRM) project, an approximately 5-year-long program to design, develop, test and evaluate the next-generation Space Shuttle solid rocket motor.

Issuance of the statement completes a key step in the agency's process of assessing environmental factors associated with locating the major ASRM production and testing facilities at one or more of three government-owned locations.

NASA's preferred site for ASRM production is the Yellow Creek property in extreme northeastern Mississippi, presently in the custody and control of the Tennessee Valley Authority. The preferred site for motor testing is John C. Stennis Space Center near Bay St. Louis, Miss.

In addition to those two locations, the environmental impact statement addresses impacts at the Kennedy Space Center, Fla. The Kennedy center is included because it was among the three government-owned property options examined by NASA last year prior to the selection of Yellow Creek and Stennis as the preferred sites.

The statement also summarizes NASA's consideration of several ASRM design alternatives and their differing effects on the project's environmental impact. Another option considered in the assessment process is the "no-action" alternative -- that is, to halt the ASRM project and continue to use the current redesigned solid rocket motor for Shuttle flights into the next century.

- more -

NASA, with support and encouragement from Congress, has been developing plans for an improved solid rocket motor since late 1986. The project was begun in response to a need to enhance Shuttle safety and reliability over the many years in the future that the Shuttle will continue to be a principal U.S. launch vehicle. Another key objective is to achieve significantly improved booster performance compared to the current solid rocket motor. In addition, the new motor would establish a strong technical foundation for future advances in the solid fuel propulsion area.

NASA is currently evaluating proposals from two teams of companies who responded to a 1988 request for proposals inviting bids for the design, development, test and evaluation of the ASRM. The contractors also proposed on the design, construction and operation of the manufacturing plant, static testing facility and all other associated facilities. Proposals were received from Lockheed Missiles and Space Co., Sunnyvale, Calif., along with Aerojet Solid Propulsion Co., Sacramento, Calif. (which would be its principal subcontractor); and a joint venture known as Hercules-Atlantic, consisting of Hercules Inc., Magna, Utah, and Atlantic Research Corp., Gainesville, Va.

Selection of the prime contractor is planned for this spring, and the approximately 5-year-long effort would lead to delivery of the first set of flight motors by 1994. NASA's plan is for a 3-year, phase-in period during which the ASRM would replace the current motor.

NASA has committed to a variety of steps aimed at avoiding or minimizing potential environmental impacts from the ASRM project. These mitigative measures are outlined in the document.

The final version of the statement includes and reflects consideration of comments received from interested agencies, organizations and individuals following last December's publication of a draft version of the document. An additional 30-day opportunity for review began with today's issuance of the final statement. Following that, signing of a Record of Decision by NASA's associate administrator for space flight will mark completion of the environmental impact assessment process for the ASRM program.

Groundbreaking at the ASRM production site is expected to begin in June 1989.

Copies of the environmental impact statement are available for examination and copying at public libraries in communities near the three candidate sites, at NASA Headquarters and the agency's field centers.

- end -

National Aeronautics and
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March 22, 1989

Bob Lessels
Marshall Space Flight Center, Huntsville, Ala.
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RELEASE: 89-38

SHUTTLE-C USERS' CONFERENCE SLATED FOR MAY 25-26

The Marshall Space Flight Center, Huntsville, Ala., and Shuttle-C program contractors will host a Shuttle-C Users' Conference, May 25-26, at the Marriott Hotel, Huntsville, Ala.

Shuttle-C is a NASA concept of an unmanned, cargo-carrying derivative of the Space Shuttle which would provide the United States with a heavy-lift, launch capability by the middle of the next decade.

Shuttle-C would use the same external tank, solid rocket boosters and liquid-fueled main engines as used by the present Space Shuttle, but the orbiter would be replaced with an expendable cargo pod. Shuttle-C would have a projected payload-to-low-Earth-orbit capability of 50 to 75 tons -- two to three times the current Space Shuttle payload capacity.

The conference, according to Marshall center Deputy Director Thomas J. Lee, is designed to fully explain the Shuttle-C space launch vehicle and its potential for improving America's access to space. The conference also will provide potential users with an opportunity to particpate in working sessions to define their needs and requirements for a heavy-lift launch vehicle.

The conference will begin with pre-registration and a reception May 24 in the Marriott Hotel lobby. The conference will begin on May 25 with opening remarks by Marshall center Director James R. Thompson Jr.; Darrell R. Branscome, NASA director for advanced program development; and Robert G. Eudy, Marshall manager of the Shuttle-C task team.

- more -

Five workshop sessions will focus on Shuttle-C support of planetary missions and Space Station Freedom, launching scientific and applications payloads, use as a technology test bed and support of Department of Defense requirements.

Conferees will be given a tour of the Marshall Space Flight Center on May 26, including a visit to the full-scale Shuttle-C Engineering Development Unit now being assembled.

Persons interested in conference participation should contact David Christensen, coordinator, at United Technologies Corp., (205/721-5514).

- end -

NASA News

National Aeronautics and
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For Release:
March 23, 1989

RELEASE: 89-39

ASTRONAUT HAUCK DEPARTING NASA FOR NAVY POST AT PENTAGON

Three-time spaceflight veteran Capt. Frederick Hauck (USN), crew commander of the first post-Challenger Shuttle mission, has announced that he will leave NASA on April 3 to join the Pentagon staff of the Chief of Naval Operations. Hauck will serve as Director of Navy Space Systems Division, reporting in late May.

"My 11 years with NASA have been extremely rewarding. I'll miss the challenging environment and the people. I am looking forward to continuing my career in the Navy and to the new challenges it provides," said Hauck.

Selected as an astronaut in January 1978, Hauck made his first Shuttle flight as pilot on mission STS-7 in June 1983. That mission featured the deployment of two communications satellites, the first STS deployment and retrieval demonstration in space and the first formation flying of the orbiter with a free-flying satellite (SPAS-01).

In November 1984, Hauck was STS-51A mission commander, the first space salvage mission in history. Hauck and crew retrieved and returned to Earth the Palapa B-2 and Westar VI communications satellites after deploying Anik D-2 and LEASAT-1 satellites.

Following the Challenger accident, he was appointed Associate Administrator for External Relations at NASA Headquarters, Washington, D.C., in August 1986.

Hauck returned to the astronaut office in February 1987 when he was named to command the first post-Challenger mission, STS-26. In September 1988, the mission deployed the Tracking and Data Relay Satellite (TDRS-C) and conducted 11 mid-deck experiments. Hauck has logged more than 436 hours in space.

- end -

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For Release:

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March 28, 1989

RELEASE: 89-40

FINANCING ARRANGED FOR AMMONIUM PERCHLORATE PLANT

Western Electrochemical Company, Cedar City, Utah, has finalized arrangements for private financing through Security Pacific Bank Washington, Seattle, for construction of an ammonium perchlorate (AP) production plant to be located in Cedar City.

Western Electrochemical Company is a subsidiary of Pacific Engineering and Production Company (PEPCON) and an AP subcontractor to Morton Thiokol Inc., manufacturer of the Space Shuttle solid rocket motor. Construction of the Cedar City plant is underway and production is expected to begin in the summer of 1989. Western Electrochemical plans to repay the privately financed capital investment in the new plant within 7 years.

AP is an oxidizing chemical used in virtually all solid propellant rocket motors, including the Space Shuttle's solid rocket motor. NASA and the Department of Defense have agreed to combined purchases of 20 million pounds a year of AP for 7 years from Western Electrochemical Company.

- end -

National Aeronautics and
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For Release:

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March 30, 1989

RELEASE: 89-41

ROSEN NAMED ACTING ASSOCIATE ADMINISTRATOR

NASA Administrator Dr. James C. Fletcher today named Dr. Robert Rosen as acting associate administrator for aeronautics and space technology (OAST), effective April 2. Rosen has served as deputy associate administrator OAST since March 1986.

Rosen replaces acting associate administrator Dr. William F. Ballhaus, Jr. who returned to his permanent position as director of NASA's Ames Research Center, Mountain View, Calif.

In his new position, Rosen will be responsible for the direction of NASA's aeronautics and space technology programs as well as for the institutional management of NASA's Ames Research Center, Langley Research Center and Lewis Research Center.

Rosen joined NASA Headquarters in April 1985 as the director, propulsion, power and energy division, OAST. Prior to coming to NASA, Rosen held key positions in private industry, including Rocketdyne, Canoga Park, Calif., 1979-1985, and McDonnell Douglas Astronautics Company, Huntington Beach, Calif., 1968-1979

Rosen received a bachelor of science degree in 1960 from the University of Miami, Coral Gables, Fla; a master of science degree in 1962 from Northwestern University, Evanston, Ill.; a mechanical engineering degree in 1966 from the California Institute of Technology, Pasadena; and a Ph.D. in 1968 from the University of Southern California, Los Angeles.

A New York City native, Rosen and his family are residents of Vienna, Va. He is married to the former Gail Brock and they have two sons.

-end-

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March 31, 1989

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RELEASE: 89-42

NASA LEWIS AWARDS CONTRACTS FOR ADVANCED POWER SYSTEM

The NASA Lewis Research Center, Cleveland, with funding from the Department of Energy (DOE), has awarded parallel contracts to complete the design, fabrication, construction, assembly and test of an advanced power system. The system would be capable of delivering 25 kilowatts of electricity to a utility grid while operating with solar energy from an 11-meter diameter parabolic dish solar thermal energy concentrator.

The advanced power system holds promise for providing highly efficient, clean, long-life and reliable dynamic power for future terrestrial applications. This work also may have application to NASA's research on future space-power systems. The designs include a free-piston Stirling engine, a liquid metal solar heat transport receiver and a means to provide power to a utility grid.

Cost-shared contracts were awarded to two contractor teams for a 6-month preliminary design task. One team, receiving $650,000, is headed by Cummins Engine Company, Columbus, Ind., and includes Sanders Associates, Nashua, N.H., for the solar heat receiver; Thermacore, Inc., Lancaster, Pa., for the solar heat transport system; and Sunpower, Inc., Athens, Ohio, for the free-piston Stirling engine technology.

The second contractor team, receiving $720,000, is headed by Stirling Technology Company, Richland, Wash., and includes Sanders Associates, Nashua, N.H., for the solar heat receiver; Thermacore, Inc., Lancaster, Pa., for the solar heat transport system and Westinghouse Electric Corp., providing specialized services from Hanford, Wash., and Pittsburgh, Pa.

-more-

Each contractor team will feature the free-piston Stirling engine, use existing technology and emphasize manufacturability throughout the design effort.

In the fall of 1989, pending funding, it is anticipated that there will be a 24-month follow-on option to complete the final design of the advanced power system and subsequent testing. At that time, additional funding for the Cummins Engine Company team would be $3,354,000 and $3,586,000 for the Stirling Technology Company team.

Research on the Advanced Stirling Conversion System is funded by DOE's Solar Thermal Technology Program. NASA's Lewis Research Center, with substantial background and expertise in Stirling engines, is providing technical management under an interagency agreement with Sandia National Laboratories, Albuquerque, N.M., which is managing the parabolic-dish, solar thermal concentrator Stirling program.

The free-piston Stirling is an external combustion engine which can operate on heat from any source including solar thermal energy. The free-piston has only a few moving parts and operates by heating and cooling air or a gas enclosed in a cylinder.

At one end of the cylinder, a heat source, such as focused solar energy, heats the air or gas inside the cylinder. As the gas is heated, it expands and pushes the piston. Electric power to the utility grid is derived from the engine either directly, using a linear alternator, or indirectly by use of a hydraulic output to a fluid pump coupled to a generator.

A complete Stirling engine system is expected to be delivered to test facilities at Sandia National Laboratories, Albuquerque, N.M., for evaluation in 1991. Both designs meet DOE's long-term cost and performance goals.

- end -

NASA Facts
National Aeronautics and
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Washington, D.C. 20546
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Jim Ball
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April 1989

STS-30 COMMERCIAL DEVELOPMENT FLIGHT EXPERIMENTS

In a joint endeavor with Rockwell International, NASA's Office of Commercial Programs will sponsor the flight of industrial experiments to investigate the use of microgravity for producing superior-quality crystals of materials with a variety of potential commercial applications.

Participating with Rockwell in the experiments is the Indium Corporation of America, located in Utica, New York.

Taking advantage of the unique "weightless" environment of space, U.S. industrial concerns may be able to eventually produce larger, more perfectly formed crystals of materials important in the manufacture of advanced computers and other electronic and optical devices.

The STS-30 investigations into floating zone crystal growth will be performed in a Rockwell-developed microgravity laboratory known as the Fluids Experiment Apparatus (FEA), which will be installed in the Atlantis' middeck in place of one of the standard storage lockers. The FEA was developed by Rockwell's Space Transportation Systems Division.

Indium Corporation is providing sample materials for processing in the device and will collaborate with Rockwell's Science Center in Thousand Oaks, California in the post-flight analysis of the experiments.

NASA will provide Space Shuttle flight services under a Joint Endeavor Agreement (JEA) signed with Rockwell in 1987. Manifesting of the FEA on STS-30 provides the first of two Shuttle flights called for in the JEA.

The Joint Endeavor Agreement is an instrument that fosters cooperative efforts between NASA and U.S. industrial concerns. The JEA offers spaceflight opportunities to companies which invest private resources to develop and conduct space experiments in areas with commercial promise.

NASA's Office of Commercial Programs, created in 1984 to provide a focus for efforts to encourage greater private sector involvement and investment in the nation's civil space program, is responsible for negotiating JEA agreements with U.S. companies and sponsoring flights of JEA experiments aboard the Space Shuttle.

National Aeronautics and
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For Release:

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April 4, 1989

RELEASE: 89-43

NASA SELECTS SMALL EXPLORER MISSIONS

Dr. Lennard A. Fisk, associate administrator for NASA's Office of Space Science and Applications (OSSA), today announced the selection of the first Small Explorer missions, which will study some of the most important questions in space physics, astrophysics and upper atmosphere science.

Termed Small Explorers, these spacecraft weigh approximately 400 lbs. and can be launched from available Scout-class expendable launch vehicles.

The Small Explorer Program, a vital element of the OSSA strategic plan, provides frequent flight opportunities for highly focussed and relatively inexpensive space science missions. These missions allow critical training opportunities for the next generation of scientists and engineers.

The selected studies, chosen from 51 submissions, propose the following:

o A study of solar energetic particles, anomalous cosmic rays, galactic cosmic rays and magnetospheric electrons would be launched in mid-1992. Called Solar, Anomalous and Magnetospheric Particle Explorer, this study was proposed by Dr. Glenn M. Mason, University of Maryland, College Park, and 10 co-investigators from American and German institutions.

o A study of how molecular clouds collapse to form stars and planetary systems, called the Submillimeter Wave Astronomy Satellite, would be launched in mid-1993. The principal investigator is Dr. Gary J. Melnick, Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass., heading a team of 11 co-investigators from institutions across the U.S. and Cologne, Germany.

- more -

o An investigation of the processes operating within the auroral region, called Fast Auroral Snapshot Explorer, would be launched in late 1993. Dr. Charles Carlson, University of California, Berkeley, is the principal investigator. The co-investigators are from Lockheed Palo Alto Research Laboratory, Calif., and the University of California at Berkeley and Los Angeles.

o A study of stratospheric ozone is the mission of the Total Ozone Mapping Spectrometer (TOMS). It will provide daily mapping of global ozone and detect global ozone trends. TOMS was proposed by Dr. Charles E. Cote and nine co-investigators, all from NASA's Goddard Space Flight Center (GSFC), Greenbelt, Md. This investigation is a high-priority Earth observing mission that is critical to monitoring long-term stratospheric ozone depletion trends.

The Small Explorer Program is managed by the GSFC Special Payloads Division. Costs for developing such spacecraft and instrument payloads are expected to average $30 million.

The Explorer Program is a long-standing NASA program for launching small and moderate-sized space science mission payloads. Over 75 U.S. and cooperative-international scientific space missions have been part of the Explorer Program. For example, the International Ultraviolet Explorer, which produced astronomical data for more than 1,400 articles in scientific journals, continues to operate after more than 10 years in Earth orbit.

- end -

National Aeronautics and
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April 5, 1989

Jeffrey Carr
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RELEASE: 89-44

ASTRONAUTS NAMED FOR TWO SPACE SCIENCE MISSIONS

Astronaut crew members have been named for two scientific Space Shuttle missions scheduled for launch in 1990.

USAF Col. Steven R. Nagel will be commander of the Space Shuttle Discovery on mission STS-37. USMC Lt. Col. Kenneth D. Cameron will serve as pilot. Mission specialists are USAF Lt. Col. Jerry L. Ross, Jay Apt, Ph.D., and Linda M. Godwin, Ph.D.

Following Discovery's launch next April, the crew will deploy the Gamma Ray Observatory (GRO) from the payload bay using the Shuttle's robot arm. The GRO will explore gamma ray sources throughout the universe, studying the origin of our own galaxy and others, and examining quasars, pulsars and supernova remnants from an altitude of 243 miles above the Earth.

USMC Col. Bryan D. O'Connor will be commander of STS-40, the space and life sciences-dedicated mission, SLS-1. Serving as pilot aboard the Space Shuttle Columbia will be USAF Col. John E. Blaha. Also named as a mission specialist is Tamara E. Jernigan.

SLS-1 mission specialists M. Rhea Seddon, M.D., and James P. Bagian, M.D., and payload specialists F. Drew Gaffney, Ph.D., and Robert W. Phillips, Ph.D., were named previously.

Inside a pressurized laboratory fixed in Columbia's payload bay, the SLS-1 crew will conduct more than two dozen life sciences investigations in the microgravity environment. Launch is currently set for June 1990.

-more-

Nagel has flown twice in space -- as a mission specialist on Shuttle mission STS 51-G in June 1985 and as pilot on STS 61-A in October 1985. He was born Oct. 27, 1946, in Canton, Ill.

Cameron will make his first space flight. He was born Nov. 29, 1949, in Cleveland, Ohio.

Ross has previously flown on two Shuttle missions, STS 61-B in November 1985 and STS-27 last December. Ross was born Jan. 20, 1948, in Crown Point, Ind.

Apt will make his first space flight. He was born April 28, 1949, in Springfield, Mass., but considers Pittsburgh, Pa., to be his hometown.

Godwin also will make her first flight in space. She was born July 2, 1952, in Cape Girardeau, Mo.

O'Connor has flown previously as pilot on STS 61-B in November 1985. After the Challenger accident, he was named chairman of NASA's Space Flight Safety Panel. O'Connor was born Sept. 6, 1946, in Orange, Calif., but considers Twentynine Palms, Calif., to be his hometown.

Blaha made his first space flight last month as pilot of STS-29. He was born Aug. 26, 1942, in San Antonio, Texas.

Jernigan will make her first flight in space. She was born May 7, 1959, in Chattanooga, Tenn., but considers Santa Fe Springs, Calif., to be her hometown.

-end-

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AC 202-453-8400

For Release:

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April 7, 1989

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(Phone: 205/544-0034)

RELEASE: 89-45

NASA TO EXPAND UNIVERSITY RESEARCH PARTNERSHIP

NASA's Marshall Space Flight Center (MSFC), Huntsville, Ala., is initiating a program to share scientific and engineering data from flight experiments with American colleges and universities.

The universities participating in the program to date include: Auburn University, Auburn, Ala.; Northwestern State University of Louisiana, Natchitoches; and West Virginia University, Morgantown. These are among the total of six or seven universities that will be chosen for the pilot program.

The pilot program, called the NASA/University Joint Venture Initiative, will make available scientific and engineering data generated from space missions in exchange for analysis and interpretation by faculty members and students. It will be funded through the Office of Space Science and Applications, NASA Headquarters, Washington, D.C.

The universities also will be encouraged to start outreach programs to bring the excitement of the space program into secondary and elementary schools in their area.

"The future of the United States, particularly our economy, depends on our technology. It's the kids, the ones who are now making career choices about science and engineering who are going to generate the new technology of the future on which we'll depend as a nation," said Dr. Rick Chappell, associate director for science at MSFC.

- more -

In 1989, the nation's space program is expected to generate several trillion bits of raw science and engineering data. Put another way, the amount of data NASA will collect this year is roughly equal to the amount of information stored in the Library of Congress.

Analyzing and translating the data into useful knowledge presents NASA with a big challenge and offers an unprecedented opportunity -- one that will grow more important in the years ahead as NASA launches more Space Shuttles and places free-flying observatories and the Space Station Freedom in Earth orbit.

"The amount of information and data that will come down from the spacecraft is unbelievable. It's going to increase by about a factor of a thousand over the next half a decade," Chappell said.

The Joint Venture Initiative will get underway this summer as participating professors attend 10 weeks of research orientation at MSFC before returning to their respective campuses.

The program is expected to become operational nationwide in 2 years. Already the space agency works with approximately 250 of the nation's several thousand colleges and universities, but this new program is expected to significantly broaden that partnership.

NASA expects that the program will help address a growing national concern about a shortage of U.S. scientists and engineers in the years ahead.

- end -

NASA

SPACE SHUTTLE MISSION STS-30
PRESS KIT

April 1989
NASA HQ
89-46

APRIL 1989

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NASA

National Aeronautics and
Space Administration

Washington, D.C.

RELEASE: 89-46

SPACE SHUTTLE TO DEPLOY MAGELLAN PLANETARY SCIENCE MISSION

Space Shuttle mission STS-30 will deploy the Magellan Venus-exploration spacecraft into low-Earth orbit, the first U.S. planetary science mission launched since 1978 and the first planetary probe to be deployed from the Shuttle.

Following deployment, Magellan will be propelled from Earth orbit in to its Venus trajectory by an Air Force-developed, Inertial Upper Stage (IUS) booster. The spacecraft will cruise through space for some 15 months, including flying around the Sun, before reaching its Venus destination in August 1990.

Magellan's orbit insertion rockets will be fired to slow the explorer into a highly elipical orbit around planet Venus. Magellan will complete 1 orbit of Venus every 189 minutes. During its 243-day orbital mission, the spacecraft will acquire surface imaging, radiometry, altimetry and gravitational data.

Magellan will map up to 90 percent of the surface of planet Venus for the first time using a synthetic aperture radar instrument to gather high resolution, mapping data.

Commander of the 29th Space Shuttle mission is David M. Walker, captain, USN. Ronald J. Grabe, colonel, USAF, is pilot. Walker flew as the pilot aboard Discovery on mission STS-51A in November 1984, and Grabe was pilot of Atlantis on mission STS-51J in October 1985.

Mission specialists are Norman E. Thagard, M.D.; Mary L. Cleave, Ph.D.; and Mark C. Lee, major, USAF. Thagard previously flew as a mission specialist on STS-7 in June 1983 and STS-51B in April 1985. Cleave previously flew on STS-61B in November 1985. Lee is making his first Space Shuttle flight.

Liftoff of the fourth flight of orbiter Atlantis is scheduled for 2:24 p.m. EDT, April 28, from Kennedy Space Center, Fla., launch complex 39-B, into a 160-nautical-mile, 28.85-degree orbit. Nominal mission duration is 4 days, 56 minutes. Deorbit is planned on orbit 64, with landing scheduled for 3:20 p.m. EDT on May 2 at Edwards Air Force Base, Calif.

Liftoff on April 28 could occur during an 18-minute period beginning at 2:24 p.m. EDT. The launch window will grow each day by 6 to 8 minutes, reaching a maximum of 121 minutes on May 13. From May 13 until the close of the window on May 28, the launch window each day would remain at 121 minutes to protect a Transatlantic Abort Landing (TAL) abort capability. The launch window increase is dictated by the need for a daylight landing opportunity at the TAL sites.

Atlantis also will carry secondary payloads involving fluid research in general liquid chemistry and electrical storm studies. After landing, Atlantis will be towed to the NASA Ames-Dryden Flight Research Facility, Edwards, Calif., hoisted atop the Shuttle Carrier Aircraft and ferried back to the Kennedy Space Center to begin processing for its next flight.

- end -

GENERAL INFORMATION

NASA Select Television Transmission

The schedule for television transmissions from the orbiter and for the change-of-shift briefings from Johnson Space Center, Houston, will be available during the mission at Kennedy Space Center, Fla.; Marshall Space Flight Center, Huntsville, Ala.; Johnson Space Center, Houston; and NASA Headquarters, Washington, D.C. The television schedule will be updated daily to reflect changes dictated by mission operations. NASA Select television is available on Satcom F-2R, Transponder 13, located at 72 degrees west longitude.

Special Note to Broadcasters

For approximately 5 days before launch, audio interview material with the STS-30 crew will be available to broadcasters by calling 202/755-1788 between 8 a.m. to noon EDT, Monday through Friday. The material will include short sound bites, with introduction, for a total of 2 minutes. Tapes will be changed daily.

Status Reports

Status reports on the countdown, flight mission activities and landing operations will be produced by the appropriate NASA news center.

Briefings

An STS-30 mission press briefing schedule will be issued prior to launch. During the mission, flight control personnel work 8-hour shifts. Change-of-shift briefings by the off-going flight director will occur at approximately 8-hour intervals.

STS-30 QUICK LOOK

Launch Date: April 28, 1989

Launch Window: 2:24 p.m. - 2:42 p.m. EDT

Launch Site: Kennedy Space Center, Fla., Pad 39B

Orbiter: Atlantis (OV-104)

Altitude: 160 nautical miles

Inclination: 28.85 degrees

Duration: 4 days, 56 minutes

Landing Date/Time: May 2, 1989, 3:20 p.m. EDT

Primary Landing Site: Edwards Air Force Base, Calif.

Alternate Landing Sites:
Return to Launch Site - Kennedy Space Center
Transatlantic Abort Landing - Ben Guerir, Morocco
Abort Once Around - Edwards AFB

Crew:
David M. Walker, commander
Ronald J. Grabe, pilot
Norman E. Thagard, mission specialist-1
Mary L. Cleave, mission specialist-2
Mark C. Lee, mission specialist-3

Primary Payload: Magellan

Secondary Payloads:
Fluids Experiment Apparatus (FEA)
Mesoscale Lightning Experiment (MLR)

SPACE SHUTTLE LAUNCH PREPARATIONS, COUNTDOWN AND LIFTOFF

Processing activities began on Atlantis for the STS-30 mission on Dec. 14, 1988, when it was towed to Orbiter Processing Facility (OPF) bay 2 after arrival from the Ames-Dryden Flight Research Facility. Atlantis' most recent mission, STS-27, was completed with a Dec. 6, 1988, landing at Edwards Air Force Base. Post-flight deconfiguration and inspections were conducted in the processing hangar.

As planned, the three main engines were removed and taken to the main engine shop in the Vehicle Assembly Building (VAB) for the replacement of several components. During post-flight inspections, technicians discovered cracks in one of the high-pressure oxidizer turbopump bearing races on the number 3 main engine. That pump was removed and sent to Rocketdyne for analysis. It was determined that the most likely cause for the cracks was the presence of moisture inside the pump which leads to stress corrosion. The buildup process of oxidizer pumps was modified to eliminate the presence of moisture.

While in the VAB, main engine technicians replaced the turbopump that had been sent to Rocketdyne for testing. The other two pumps were replaced following rollout to the pad, where testing of all three new pumps was conducted.

Atlantis' three main engines were installed while the vehicle was in the OPF. Engine 2027 is installed in the number one position, engine 2030 is in the number two position and engine 2029 is in the number three position.

The right-hand orbital maneuvering system pod was removed in early January and transferred to the Hypergolic Maintenance Facility for repairs of a helium regulator that failed in flight. The regulator was reinstalled on Feb. 9, 1989.

Stacking of solid rocket motor (SRM) segments for flight began with the left aft booster on Mobile Launcher 1 in the Vehicle Assembly Building on Jan. 2, 1989. Booster stacking operations were completed by Feb. 19 and the external tank was mated to the two boosters on March 2.

Flight crew members were at KSC on Feb. 4 for the crew equipment interface test to become familiar with Atlantis' crew compartment and equipment associated with the mission.

The assembled Space Shuttle vehicle was rolled out of the VAB aboard its mobile launcher platform for the 4.2 mile-trip to Launch Pad 39B on March 22.

The terminal countdown demonstration test -- a dress rehearsal for STS-30 launch countdown, the flight crew and the KSC launch team -- was conducted April 6-7.

Preparations scheduled the last 2 weeks prior to launch countdown included final vehicle ordnance activities, such as power-on stray-voltage checks and resistance checks of firing circuits; loading the fuel cell storage tanks; pressurizing the hypergolic propellant tanks aboard the vehicle; final payload closeouts; and a final functional check of the range safety and SRB ignition, safe and arm devices.

The launch countdown is scheduled to pick up at the T-minus-43-hour mark, leading up to the STS-30 launch. Atlantis' fourth launch will be conducted by a joint NASA/industry team from Firing Room 1 in the Launch Control Center at Complex 39.

IUS/MAGELLAN PRELAUNCH PAYLOAD PREPARATION AT KSC

The Magellan spacecraft arrived at KSC from Denver, Colo., on Oct. 8, 1988. It made the trip aboard a specially cushioned, instrumented and environmentally controlled truck-trailer supplied by KSC. It was taken to the Spacecraft Assembly and Encapsulation Facility-2 (SAEF-2) planetary spacecraft check-out facility for integration.

The high-gain antenna was installed on Dec. 4, but removed later to facilitate other payload element integration. The forward equipment module and spacecraft upper body were mated with the liquid propulsion module on Dec. 21. Magellan's radar module was installed on Jan. 6, 1989. The storable propellants used for mid-course corrections and spacecraft control at Venus were loaded aboard on Jan. 18. The spacecraft was then mated with the Star 48 solid propellant orbit insertion motor on Feb. 3. The two solar panels were attached and tested on Feb. 5.

Together with the Deep Space Network, testing was performed to demonstrate the ability of the worldwide tracking network to communicate with Magellan and to simulate Magellan's functions at Venus. These tests also highlighted the unique characteristics that will aid flight controllers in understanding idiosyncrasies in the spacecraft's performance enroute to Venus and while in orbit around the planet.

On Feb. 15, the spacecraft was relocated from SAEF-2 to the Vertical Processing Facility for mating with its Inertial Upper Stage booster 2 days later.

On Feb. 18, a week of integrated testing began. The electrical connections between the IUS and Magellan were verified, and a test was run to affirm the ability of all the principal ground control facilities and the Deep Space Network to communicate with the payload.

The high-gain antenna was reintegrated with the spacecraft on Feb. 26 and tested for flight. A test also was run to simulate the payload's deployment from Atlantis. STS-30 astronauts Mark Lee and Mary Cleave participated in the deployment exercise.

Riding in the payload canister atop the associated transporter, the IUS/Magellan payload was transported to the launch pad on March 17. The payload was installed in the payload bay of Atlantis on March 25. An integrated electrical test with the orbiter was performed. This was followed by testing to verify that the principal ground stations could communicate with IUS/Magellan via the communications systems of the Space Shuttle.

STS-30 MISSION OBJECTIVES

The primary objective of this Space Shuttle mission is to successfully deploy the Magellan spacecraft on its way to Venus. Deployment will occur on orbit 5, 6 hours, 18 minutes into the mission. Alternate deployment opportunities are available on orbits 6 and 7, with additional backup deployment opportunities available throughout flight day 2.

Additionally, the Fluids Experiment Apparatus (FEA) and Mesoscale Lightning Experiment (MLE) middeck experiments and Air Force Maui Optical Site (AMOS), along with Detailed Test Objectives (DTO) and Detailed Secondary Objectives (DSO) will be performed during the flight.

The objectives of the Magellan mission are to obtain radar images of more than 70 percent of Venus' surface, a near-global topographic map and near-global gravity field data. The mission should help develop an understanding of the planet's geological evolution, particularly its density distribution and dynamics.

MAJOR COUNTDOWN MILESTONES

Countdown	Event
T-43 Hours	Power up the Space Shuttle vehicle.
T-30 Hours	Activate orbiter's navigation aids.
T-27 Hours (holding)	Enter the first built-in hold for 8 hours.
T-27 Hours (counting)	Begin preparations for loading fuel cell storage tanks with liquid oxygen and liquid hydrogen reactants.
T-25 Hours	Load the orbiter's fuel cell tanks with liquid oxygen.
T-22 Hours, 30 minutes	Load the orbiter's fuel cell tanks with liquid hydrogen.
T-22 Hours	Perform interface check between Houston Mission Control and the Merritt Island Launch Area (MILA) tracking station.
T-20 Hours	Activate and warm up inertial measurement units (IMUs).
T-19 Hours (holding)	Enter 8-hour built-in hold.
T-19 Hours (counting)	Resume countdown.
T-18 Hours	Activate orbiter communications system.
T-11 Hours (holding)	Start 15 hour, 4-minute built-in hold. Perform orbiter ascent switch list in the orbiter flight and mid-decks.
T-11 Hours (counting)	Retract Rotating Service Structure from vehicle to launch position.
T-9 Hours	Activate orbiter's fuel cells.
T-8 Hours	Configure Mission Control communications for launch. Start clearing blast danger area.
T-6 Hours, 30 minutes	Perform Eastern Test Range open loop command test.
T-6 Hours (holding)	Enter 1-hour built-in hold.
T-6 Hours (counting)	Start external tank chilldown and propellant loading.
T-5 Hours	Start IMU pre-flight calibration.
T-4 Hours	Perform MILA antenna alignment.
T-3 Hours (holding)	2-hour built-in hold begins. Loading the external tank is complete and is in a stable replenish mode. Ice team goes to pad for inspections. Closeout crew goes to white room to begin preparing orbiter's cabin for the flight crew's entry. Wake flight crew (launch minus 4 hours, 55 minutes).
T-3 Hours (counting)	Resume countdown.
T-2 Hours, 55 minutes	Flight crew departs O&C Building for Launch Pad 39-B (Launch minus 3 hours, 15 minutes).

T-2 Hours, 30 minutes	Crew enters orbiter vehicle (Launch minus 2 Hours, 50 minutes).
T-60 minutes	Start pre-flight alignment of IMUs.
T-20 minutes (holding)	10-minute built-in hold begins.
T-20 minutes (counting)	Configure orbiter computers for launch.
T-10 minutes	White room closeout crew cleared through the launch danger area roadblocks.
T-9 minutes (holding)	Enter 1 hour, 10-minute built-in hold. Perform status check and receive Launch Director and Mission Management Team "go."
T-9 minutes (counting)	Start ground launch sequencer.
T-7 minutes, 30 sec.	Retract orbiter access arm.
T-5 minutes	Pilot starts auxiliary power units. Arm range safety, SRB ignition systems.
T-4 minutes, 55 sec.	Start liquid oxygen drainback.
T-3 minutes, 30 sec.	Orbiter goes on internal power.
T-2 minutes, 55 sec.	Pressurize liquid oxygen tank for flight and retract gaseous oxygen vent hood.
T-1 minute, 57 sec.	Pressurize liquid hydrogen tank.
T-31 seconds	"Go" from ground computer for orbiter computers to start the automatic launch sequence.
T-28 seconds	Start solid rocket booster hydraulic power units.
T-21 seconds	Start SRB gimbal profile test.
T-6.6 seconds	Main engine start.
T-3 seconds	Main engines at 90 percent thrust.
T-0	SRB ignition, holddown-post release and liftoff.
T+7 seconds	Shuttle clears launch tower and control switches to Houston.

SPACE SHUTTLE ABORT MODES

Space Shuttle launch abort philosophy aims toward safe and intact recovery of the flight crew, orbiter and its payload. Abort modes include:

* Abort-To-Orbit (ATO) -- Partial loss of main engine thrust late enough to permit reaching a minimal 105-nautical mile orbit with orbital maneuvering system engines.

* Abort-Once-Around (AOA) -- Earlier main engine shutdown with the capability to allow one orbit around before landing at Edwards Air Force Base, Calif.; White Sands Space Harbor (Northrup Strip), N.M.; or the Shuttle Landing Facility (SLF) at Kennedy Space Center, Fla.

* Transatlantic Abort Landing (TAL) -- Loss of two main engines midway through powered flight would force a landing at Ben Guerir, Morocco; Moron, Spain; or Banjul, The Gambia.

* Return-To-Launch-Site (RTLS) -- Early shutdown of one or more engines and without enough energy to reach Ben Guerir, would result in a pitch around and thrust back toward KSC until within gliding distance of the Shuttle Landing Facility (SLF).

STS-30 contingency landing sites are Edwards AFB, White Sands, Kennedy Space Center, Ben Guerir, Moron and Banjul.

SUMMARY OF MAJOR FLIGHT ACTIVITIES

Day One

Ascent
Post-insertion checkout
Pre-deploy checkout
Magellan/Inertial Upper Stage deploy

Day Two

Magellan/IUS backup deploy opportunity
Air Force Maui Optical Site (AMOS) tests
Detailed Test Objective (DTO)/Detailed Secondary Objective (DSO)
Fluids Experiment Apparatus (FEA)
Mesoscale Lightning Experiment (MLE)

Day Three

AMOS
DTO/DSO
FEA
MLE

Day Four

AMOS
DTO/DSO
MLE
Flight control systems checkout
Cabin stowage
Landing preparations

Day Five

Deorbit preparation
Deorbit burn
Landing at Edwards Air Force Base, Calif.

STS-30 TRAJECTORY SEQUENCE OF EVENTS

EVENT	RELATIVE MET (d/h:m:s)	VELOCITY (fps)	MACH	ALTITUDE (ft)
Launch	00/00:00:00			
Begin Roll Maneuver	00/00:00:09	183	.16	774
End Roll Maneuver	00/00:00:17	365	.32	2,825
SSME Throttle Down to 65%	00/00:00:30	711	.64	9,043
Max. Dyn. Pressure (Max Q)	00/00:00:59	1,368	1.35	35,133
SSME Throttle Up to 104%	00/00:01:02	1,428	1.43	37,284
SRB Staging	00/00:02:05	4,212	3.93	153,405
Negative Return	00/00:03:58	6,915	7.39	319,008
Main Engine Cutoff (MECO)	00/00:08:31	24,286	22.70	362,243
Zero Thrust	00/00:08:38			
ET Separation	00/00:08:45			
OMS 1 Burn	00/00:10:31			
OMS 2 Burn	00/00:44:27			
Magellan/IUS Deploy (orbit 5)	00/06:18:00			
Deorbit Burn (orbit 64)	03/23:53:00			
Landing (orbit 65)	04/00:53:00			
Apogee, Perigee at MECO:	85 x 3 nm			
Apogee, Perigee post-OMS 1:	160 x 51 nm			
Apogee, Perigee post-OMS 2:	160 x 160 nm			
Apogee, Perigee post-deploy:	176 x 161 nm			

LANDING AND POST-LANDING OPERATIONS

The Kennedy Space Center is responsible for ground operations of the orbiter once it has rolled to a stop on the runway at Edwards Air Force Base. Those operations include preparing the Shuttle for the return trip to Kennedy.

After landing, the flight crew aboard Atlantis begins "safing" vehicle systems. Immediately after wheelstop, specially garbed technicians will first determine that any residual hazardous vapors are below significant levels in order for other safing operations to proceed.

A mobile white room is moved into place around the crew hatch once it is verified that there are no concentrations of toxic gases around the forward part of the vehicle. The crew is expected to leave Atlantis about 45 to 50 minutes after landing. As the crew exits, technicians enter the orbiter to complete the vehicle safing activity.

Once the initial aft safety assessment is made, access vehicles are positioned around the rear of the orbiter so that lines from the ground purge and cooling vehicles can be connected to the umbilical panels on the aft end of Atlantis.

Freon line connections are completed and coolant begins circulating through the umbilicals to aid in heat rejection and protect the orbiter's electronic equipment. Other lines provide cooled, humidified air to the payload bay and other cavities to remove any residual fumes and provide a safe environment inside Atlantis.

A tow tractor will be connected to Atlantis and the vehicle will be pulled off the runway at Edwards and positioned inside the Mate/Demate Device at the nearby Ames-Dryden Flight Research Facility. After the Shuttle has been jacked and leveled, residual fuel cell cryogenics are drained and unused pyrotechnic devices are disconnected prior to returning the orbiter to Kennedy.

The aerodynamic tail cone is installed over the three main engines, and the orbiter is bolted on top of the 747 Shuttle Carrier Aircraft for the ferry flight back to Florida. Pending completion of planned work and favorable weather conditions, the 747 would depart California about 6 days after landing for the cross-country ferry flight back to Florida. A refueling stop is necessary to complete the journey.

Once back at Kennedy, Atlantis will be towed inside the hangar-like Orbiter Processing Facility for post-flight inspections and in-flight anomaly troubleshooting. These operations are conducted in parallel with the start of routine systems reverification to prepare Atlantis for its next mission.

MAGELLAN

Mission Description

The Magellan mission will map up to 90 percent of the surface of Venus to a high degree of resolution. The spacecraft's primary science instrument is an imaging radar, called a Synthetic Aperture Radar (SAR). In addition to mapping, precise tracking of Magellan radio signals will improve our knowledge of the Venusian gravity field.

Magellan is the first planetary probe to be launched from a Space Shuttle and the first planetary spacecraft to be launched in nearly 11 years.

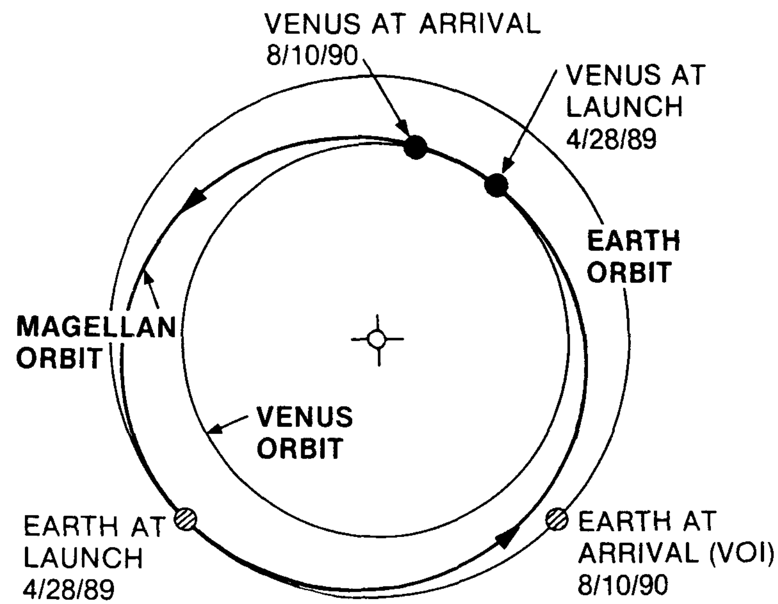
The imaging radar is capable of performing both surface imaging and altitude measurements. It is able to resolve surface features measuring from about 250 meters near the equator to about 750 meters near the north pole through the thick clouds that perpetually shroud the planet. The altimeter will measure elevations accurate to about 30 meters.

Following insertion into Venus orbit in August 1990, approximately 18 days will be spent checking out the spacecraft and its imaging radar. The prime mapping mission then will begin, lasting 243 Earth days or 1 Venus day.

A proposed extended mission would be used to map those areas missed when the Sun is between Venus and Earth and when Venus is between the spacecraft and Earth. It also would be used to determine irregularities in the planet's interior by measuring gravity.

Magellan's trajectory to Venus is called a Type IV transfer. It requires the spacecraft to go one and one-half times around the Sun before it goes into orbit around Venus. Although the Type IV transfer has advantages of lower launch energy and lower Venus approach speed, the main reason for using this trajectory is that it allows the Galileo mission to be launched by the Shuttle in October 1989, the launch time required by Magellan for the shorter and faster trajectory to Venus.

In the mapping orbit, the spacecraft will approach the planet as close as 155 miles. That is called periapsis. At its furthest point in its elliptical orbit, the spacecraft will be 4,977 miles from the planet's surface. That is apoapsis. Magellan will make one orbit every 3 hours, 9 minutes.



EARTH TO VENUS MAGELLAN TRAJECTORY

The approach to Venus is over the northern hemisphere with a mapping swath that goes from north to south. The radar mapping is done for a 37-minute period each orbit when the spacecraft is close to the planet, and when it is at apoapsis, it transmits the data back to Earth.

The mapping profile of Magellan includes two swaths of coverage done alternately, one beginning further north than the next. As the spacecraft approaches the planet, it will begin mapping the north swath at 90 degrees north latitude and continue to 54 degrees south latitude. On the next orbit, it will begin 4.7 minutes later for the south swath and begin mapping at 76 degrees north latitude and continue to 68 degrees south.

Magellan will make 1,852 mapping swaths around the planet during the primary mission. Mapping data are transmitted back to Earth at 268.8 kilobits per second. The data are received by the 70-meter tracking station network, that is, the largest radio telescopes of the Deep Space Network locations at Goldstone, Calif.; near Madrid, Spain; and at Canberra, Australia.

As each orbit continues toward apoapsis, the spacecraft plays back the data to Earth. During this time, it interrupts its playback to make star calibrations to confirm its attitude data base. Magellan looks at the positions of two stars in the sky and compares them with a star map in its computer. This fixes its attitude in relation to the planet. Then it resumes its data playback. When the second playback is completed the antenna is rotated back toward the planet for the next mapping sequence.

Magellan Spacecraft

The Magellan spacecraft was designed and constructed by Martin Marietta Astronautics Group, Denver, Colo. The height of the spacecraft is 21 feet. It is 15 ft. in diameter and weighs 7,604 pounds.

Several subsystems make up the spacecraft system. They include the structure, thermal control, power, attitude control, propulsion, command data and data storage, and telecommunications.

The structure is composed of four major sections: the high-gain antenna, forward equipment module, spacecraft bus including solar array and orbit-insertion stage.

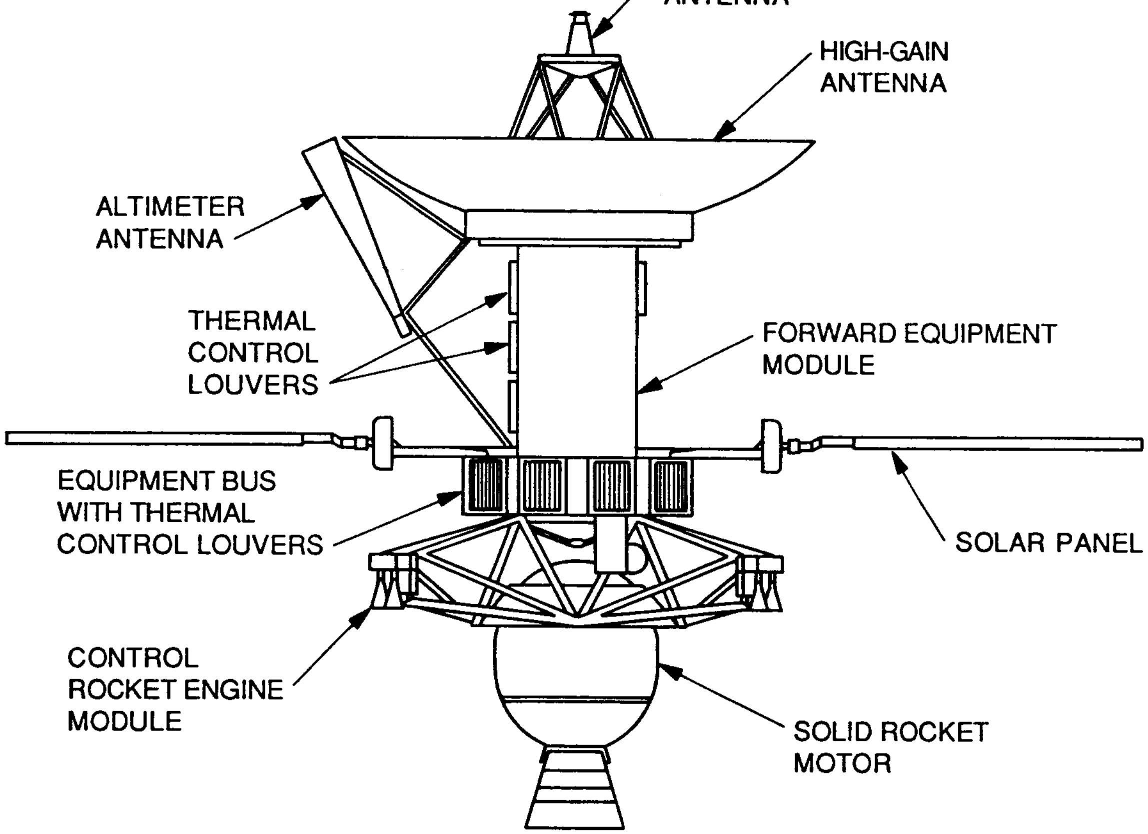
The high-gain antenna is used as the antenna for the synthetic aperture radar as well as the primary antenna for the telecommunications system to send data back to Earth. The 11.8-ft. diameter parabolic dish is made of strong, lightweight graphite epoxy sheets mounted on an aluminum honeycomb for rigidity. It is a spare from the Voyager project.

There also is a cone-shaped medium-gain antenna used for receiving commands by and sending engineering data from Magellan during the 15-month cruise from Earth. A low-gain antenna provides the ground team with an alternative means of commanding the spacecraft in case of an emergency that prevents use of normal data rates.

The altimeter antenna is mounted to one side of the high-gain antenna and is pointed vertically down at the surface of the planet during the radar data acquisitions.

The forward equipment module contains the radar electronics, the reaction wheels which control the spacecraft's attitude in space and other subsystem components.

The bus is a 10-sided structure consisting of the remainder of the subsystem components, including the solar panel array, star scanner, medium-gain antenna, rocket engine modules, command data and data storage subsystem, monopropellant tank and a nitrogen tank for propellant pressurization.



MAGELLAN SPACECRAFT

The orbit insertion stage contains a Star 48 solid rocket motor to place the spacecraft into orbit around Venus. Once in orbit, the motor casing is jettisoned.

A combination of louvers, thermal blankets, passive coatings and heat-dissipating elements are used to control the spacecraft's temperature. The normal operating temperature range for the spacecraft components is between 25 to 104 degrees Fahrenheit.

Power for the spacecraft and the experiments is provided by two solar panels with a total area of 12.6 square meters. The array is capable of producing 1,200 watts. Both direct (dc) and alternating current (ac) are provided with dc power at 28 to 35 volts and ac power at 2.4 kilohertz.

Two 30-amp hour, 26-cell nickel cadmium batteries provide power when the spacecraft is in the shadow of the planet and allow normal spacecraft operations independent of solar illumination. The batteries remain charged by using power provided by the solar arrays.

The three reaction wheels, which control the spacecraft's attitude in relation to the planet, are driven by electric motors and store momentum while they are spinning. At a point in each orbit near apoapsis, the monopropellant rocket motors are used to counteract the torque on the spacecraft as the reaction wheels are despun to eliminate the excess momentum. There is one reaction wheel for each of the spacecraft's three axes -- yaw, pitch and roll.

The Star 48 rocket used to put the spacecraft into orbit around Venus weighs 4,721 lbs., of which 4,430 lbs. are fuel. It has a thrust of 15,232 lbs.

The spacecraft also has 24 thrusters used for trajectory correction and attitude control. Eight of the thrusters have 100 lbs. of thrust each. Four have 5 lbs. of thrust and 12 have 0.2 lb. of thrust. The smallest thrusters are used for attitude control and momentum unloading of the spacecraft at apoapsis.

Radar System

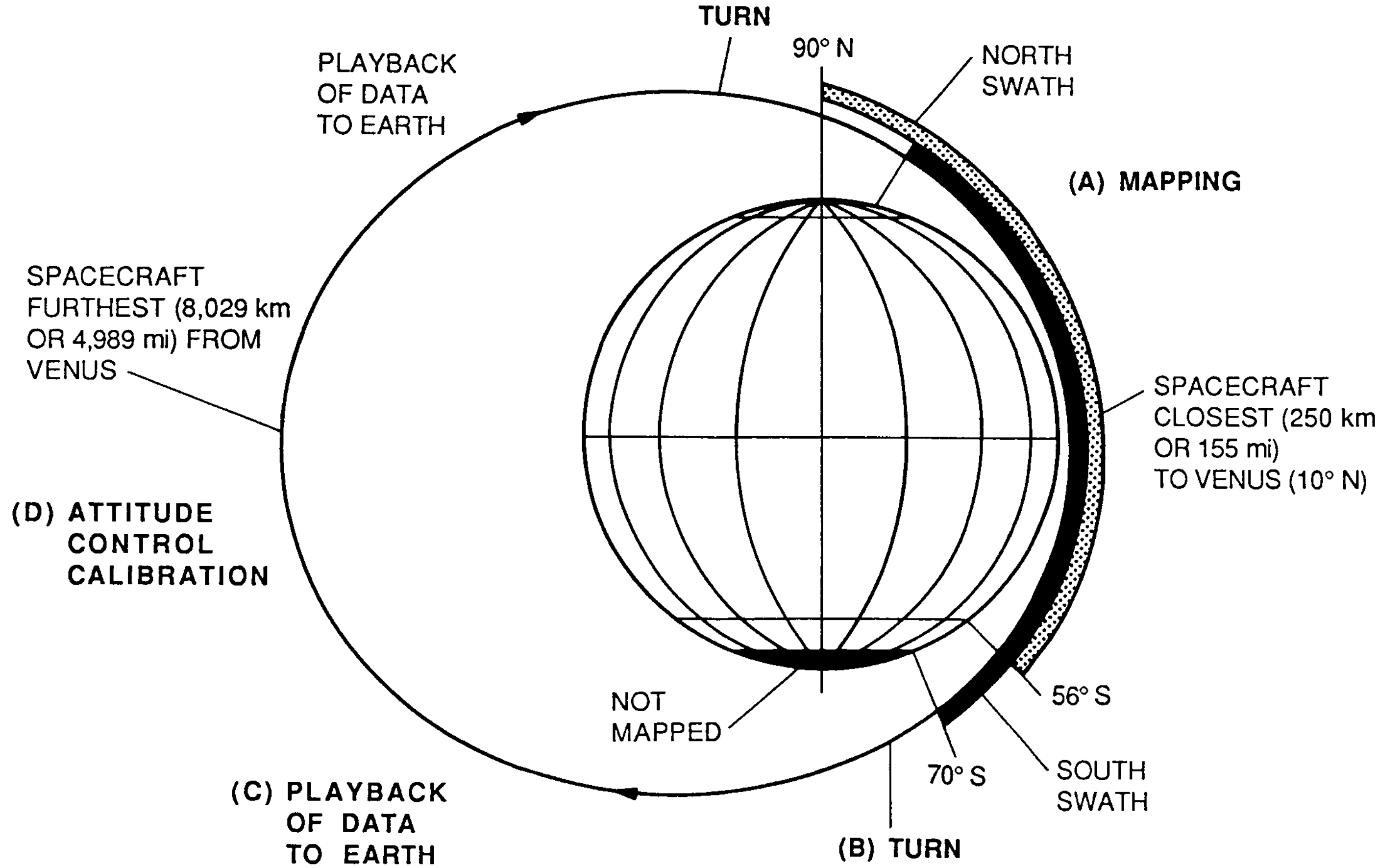
The radar system was built by the Hughes Aircraft Company, Space and Communications Group. The radar is used for Venus mapping because it can penetrate the thick clouds covering the planet. Optical photography cannot penetrate the clouds.

Real aperture radars can be used to make images, but the resolution is poor. Magellan's synthetic aperture radar (SAR) will create high-resolution images by using computer processing on Earth to simulate a large antenna on the spacecraft. The onboard radar system will operate as though it has a huge antenna, hundreds of meters long. The antenna is actually 12 ft. in diameter.

The radar system will measure the strength of the received signals (brightness), how long each signal took to make the round-trip to the target point and back (range) and changes in the signal frequency (pitch) resulting from the spacecraft's motion. That information will allow computers on Earth to develop high-resolution pictures from the data.

The SAR is sometimes called a side-looking radar because it looks at its target at an angle to the side of the flight path, while the altimetry radar looks straight down.

A digital computer on Earth forms elements of the image by taking into account the time delay, the phase (or frequency) of the radar wave and the magnitude of the radar return echo as the spacecraft moves along its path.



MAGELLAN VENUS ORBITAL OPERATIONS

While the primary function of the SAR is imaging, it also performs altimetry and radiometry. In the imaging mode, the radar views Venus with the large mapping antenna. The length of the synthetic aperture varies with the altitude and speed of Magellan as it flies by. At its closest point to the planet, the resolution will be about 250 meters. In the altimetry mode, it uses a separate antenna to look at the planet directly beneath the spacecraft and determines vertical features to a resolution of about 30 meters.

When the radar system is operated in the passive mode it operates as a radiometer and measures natural thermal emissions from the surface. That will help scientists determine the composition of surface materials.

Command and Data System (CDDS)

The brain of the spacecraft is its command and data system. It receives commands transmitted from Earth and controls the spacecraft in response to those commands. The system also controls the acquisition and storage on tape recorders of scientific data and sends that information back to Earth through the radio frequency subsystem.

The core of the system consists of computers in redundant pairs. All are fully reprogrammable and all are modified Galileo equipment.

The system, called the CDDS, stores commands for up to 3 days of radar operation during the orbit phase. There also is a provision for receiving and executing separate commands transmitted from the ground. Engineering data normally will be transmitted to Earth in real time. When a real-time link is not possible, the data will be tape recorded and played back on a high-rate link.

The imaging radar data will be stored on two multitrack digital tape recorders for later playback over the high-rate band. There is no provision for real-time transmission of the SAR data because the large antenna must be pointed at Venus during mapping.

The data storage capacity of the two digital tape recorders is about 1.8 billion bits. The recorders will be used primarily for the recording of SAR data, but low-rate engineering data can be stored during mapping or other periods when engineering data cannot be transmitted back to Earth in real time.

Gravity Experiment

An experiment to measure Venus' density at different locations will use the radio subsystem. The gravity measurements will be taken when the high-gain antenna is pointed toward Earth, instead of the surface of Venus, and is in a radio transmission mode.

When a spacecraft is close to a massive body such as Venus, it experiences changes in acceleration due to irregularities in the density of the planet. Those speed variations can be determined by measuring the speed of the spacecraft every few seconds with an Earth-based radio tracking system. The changes in speed are gravity measurements.

The differences in speed will be very small, but even a small speed-up would be apparent by measuring the doppler shift of the radio wave. It would indicate a planet area of greater density. If the spacecraft showed a small deceleration, it would indicate an area of lesser density. These readings would give scientists a better understanding of the planet's interior.

Since Venus rotates very slowly beneath the orbiting spacecraft, one orbit profile will be very similar to the one preceding it. If many sequential orbits are obtained, their gravity profiles can be added to the topographic map.

With the present mission geometry, high-resolution gravity data will not be obtained until well into the extended mission. Then the gravity data will be acquired for only 160 more days because the Sun will come between the spacecraft and Earth for a period of time.

This factor limits the global gravity coverage to 66 percent. However, there is a subsequent period of 265 days during which complete high-resolution global coverage can be obtained without interference caused by planetary positions.

MAGELLAN SCIENCE TEAM

The Magellan science team includes members representing five nations. Investigators were selected by NASA from institutions scattered throughout the United States: Aerospace Corporation, Geological Technology Research Institute, National Astronomy and Ionosphere Center of Cornell University (Puerto Rico), Rand Corp., Smithsonian Astrophysical Observatory and Vexcel Corp.

University participation is through the Massachusetts Institute of Technology; Brown, Southern Methodist, Stanford and Washington Universities; and the Universities of Arizona, Arkansas and California. Governmental agency participants are from NASA centers and the U.S. Geological Survey.

International investigators come from the Australian National University, the Canada Center for Remote Sensing, the Universities of London and Oxford and Ballard Laboratories (England), and the Group de Recherches de Geodesie Spatiale and the Observatoire de Pic-du-Midi-Toulouse (France).

VENUS FACTS

Radius: 3,630 miles
Rotational Period: 243 Earth days
Orbit Period: 225 Earth days
Distance from Sun: 64,920,000 miles
Density: 5.2 times that of water
Surface Gravity: .907 times that of Earth's gravity
Atmospheric Pressure at Surface: 90 times that of Earth's surface pressure
Temperature at Surface: 850 degrees Fahrenheit
Atmospheric Composition: Carbon dioxide (96%); nitrogen (3+%); trace amounts of sulfur dioxide, water vapor, carbon monoxide, argon, helium, neon, hydrogen chloride and hydrogen fluoride

MAGELLAN MISSION HIGHLIGHTS

Interplanetary Cruise: 442 - 468 days
Planned Trajectory Correction Maneuvers - 15 days after deployment from Shuttle; 360 days after deployment from Shuttle; and 17 days before Venus orbit insertion
Orbit Insertion: Aug. 10, 1990, 1700 GMT, STAR 48 solid rocket motor fires to put spacecraft in orbit around Venus
Mapping Orbit Period: 3.15 hours
Radar Mapping: 37 minutes per orbit
Mapping Orbit Inclination: 86 degrees
Superior Conjunction: Oct. 26 - Nov. 9, 1990
End of Nominal Mission: April 28, 1991
Data Gap Recoverable: June 27 - July 10, 1991

RADAR INVESTIGATION GROUP

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Joseph H. Binsack, Massachusetts Institute of Technology
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INERTIAL UPPER STAGE

The Inertial Upper Stage (IUS) will be used with the Space Shuttle to transport NASA's Magellan spacecraft out of Earth's orbit to Venus, some 26 million miles from Earth.

IUS-18, the IUS to be used on mission STS-30, is a two-stage solid-propellant vehicle weighing approximately 32,500 pounds.

The IUS is 17 feet long and 9.25 ft. in diameter. It consists of an aft skirt; an aft stage solid rocket motor (SRM) containing approximately 21,400 lb. of propellant and generating approximately 42,000 lb. of thrust; an interstage; a forward stage SRM with 6,000 lb. of propellant generating approximately 18,000 lb. of thrust; and an equipment support section.

The equipment support section contains the avionics, which provide guidance, navigation, control, telemetry, command and data management, reaction control and electrical power. All mission-critical components of the avionics system, along with thrust vector actuators, reaction control thrusters, motor igniter and pyrotechnic stage separation equipment are redundant to assure better than 98 percent reliability.

The IUS Airborne Support Equipment (ASE) is the mechanical, avionics, and structural equipment located in the orbiter. The ASE support the IUS and the Magellan in the orbiter payload bay and elevates the Magellan/IUS combination on a tilt table to 52 degrees for final checkout and deployment from the orbiter.

The IUS ASE consists of the structure, aft tilt-frame actuator, batteries, electronics and cabling to support the Magellan/IUS combination. These ASE subsystems enable the deployment of the combined vehicle; provide, distribute and/or control electrical power to the IUS and spacecraft; and serve as communication conduits between the IUS and/or spacecraft and the orbiter.

The IUS structure is capable of supporting all the loads generated internally and also by the cantilevered spacecraft during orbiter operations and IUS free flight. In addition, the structure physically supports all the equipment and solid rocket motors within the IUS, and provides the mechanisms for IUS stage separation. The major structural assemblies of the two-stage IUS are the equipment support section, interstage and aft skirt. It is made of aluminum skin-stringer construction, with longerons and ring frames.

The equipment support section houses the majority of the avionics of the IUS. The top of the equipment support section contains the spacecraft interface mounting ring and electrical interface connector segment for mating and integrating the spacecraft with the IUS. Thermal isolation is provided by a multilayer insulation blanket across the interface between the IUS and Magellan.

The avionics subsystems consist of the telemetry, tracking, and command subsystems; guidance and navigation subsystem; data management; thrust vector control; and electrical power subsystems. These subsystems include all the electronic and electrical hardware used to perform all computations, signal conditioning, data processing, and formatting associated with navigation, guidance, control, data and redundancy management. The IUS avionics subsystems also provide the equipment for communications between the orbiter and ground stations, as well as electrical power distribution.

Attitude control in response to guidance commands is provided by thrust vectoring during powered flight and by reaction control thrusters while coasting.

Attitude is compared with guidance commands to generate error signals. During solid motor firing, these commands gimble the IUS's movable nozzle to provide the desired attitude pitch and yaw control. The IUS's roll axis thrusters maintain roll control. While coasting, the error signals are processed in the computer to generate thruster commands to maintain the vehicle's attitude or to maneuver the vehicle.

The IUS electrical power subsystem consists of avionics batteries, IUS power distribution units, power transfer unit, utility batteries, pyrotechnic switching unit, IUS wiring harness and umbilical, and staging connectors. The IUS avionics system distributes electrical power to the Magellan/IUS interface connector for all mission phases from prelaunch to spacecraft separation.

The IUS two-stage vehicle uses both a large and small SRM. These motors employ movable nozzles for thrust vector control. The nozzles provide up to 4 degrees of steering on the large motor and 7 degrees on the small motor. The large motor is the longest thrusting duration SRM ever developed for space, with the capability to thrust as long as 150 seconds. Mission requirements and constraints (such as weight) can be met by tailoring the amount of propellant carried.

The reaction control system controls the Magellan/IUS spacecraft attitude during coasting; roll control during SRM thrustings; velocity impulses for accurate orbit injection; and the final collision avoidance maneuver.

As a minimum, the IUS includes one reaction control fuel tank with a capacity of 120 lb. of hydrazine. Production options are available to add a second or third tank; however, IUS-18 will require only one tank, with 120 lb. of fuel.

To avoid spacecraft contamination, the IUS has no forward facing thrusters. The reaction control system is also used to provide the velocities for spacing between several spacecraft deployments and avoiding collision or contamination after the spacecraft separates.

The Magellan spacecraft is physically attached to the IUS at eight attachment points, providing substantial load carrying capability while minimizing the transfer of heat across the connecting points. Power, command and data transmission between the two are provided by several IUS interface connectors. In addition, the IUS provides a multilayer insulation blanket of aluminized Kapton with polyester net spacers across the Magellan/IUS interface, along with an aluminized Beta cloth outer layer. All IUS thermal blankets are vented toward and into the IUS cavity, which in turn is vented to the orbiter payload bay. There is no gas flow between the spacecraft and the IUS. The thermal blankets are grounded to the IUS structure to prevent electrostatic charge buildup.

After the orbiter payload bay doors are opened in orbit, the orbiter will maintain a preselected attitude to keep the payload within thermal requirements and constraints.

On-orbit IUS predeployment checkout is accomplished, followed by an IUS command link check and spacecraft communications check. Orbiter trim maneuver(s) are normally performed at this time.

Forward payload restraints will be released and the aft frame of the airborne support equipment will tilt the Magellan/IUS to 29 degrees. This will extend the payload into space just outside the orbiter payload bay, allowing direct communication with Earth during systems checkout. The orbiter will then be maneuvered to the deployment attitude. If a problem has developed within the spacecraft or IUS, the IUS and its payload can be restowed.

Prior to deployment, the spacecraft electrical power source will be switched from orbiter power to IUS internal power by the orbiter flight crew. After verifying that the spacecraft is on IUS internal power and that all Magellan/IUS predeployment operations have been successfully completed, a "Go/No-Go" decision for deployment will be sent to the crew.

When the orbiter flight crew is given a "Go" decision, it will activate the ordnance that separates the spacecraft's umbilical cables. The crew will then command the electromechanical tilt actuator to raise the tilt table to a 52-degree deployment position. The orbiter's Reaction Control System (RCS) thrusters will be inhibited and an ordnance separation device initiated to physically separate the IUS/spacecraft combination from the tilt table. Compressed springs provide the force to jettison the IUS/Magellan from the orbiter payload bay at approximately 6 inches per second. The deployment is normally performed in the shadow of the orbiter or in Earth eclipse.

The tilt table will then be lowered to minus 6 degrees after the IUS and spacecraft are deployed. A small orbiter maneuver will be made to back away from IUS/Magellan. Approximately 19 minutes after deployment the orbiter's OMS engines will be ignited to move the orbiter away from the IUS/spacecraft.

After deployment, IUS/Magellan is controlled by the IUS onboard computers. Approximately 10 minutes after IUS/Magellan is deployed from the orbiter, the IUS onboard computer will send out signals used by the IUS and/or Magellan to begin mission sequence events. This signal also will enable the RCS and initiate deployment of the spacecraft's solar panels. All subsequent operations will be sequenced by the IUS computer, from transfer orbit injection through spacecraft separation and IUS deactivation.

After the RCS has been activated, the IUS will maneuver to the required thermal attitude and perform any required spacecraft thermal control maneuvers.

At approximately 45 minutes after deployment from the orbiter, the ordnance inhibits for the first SRM will be removed. The belly of the orbiter already will have been oriented towards the IUS/Magellan combination to protect the orbiter windows from the IUS's plume. The IUS will recompute the first ignition time and maneuvers necessary to attain the proper attitude for the first thrusting period. When the proper transfer orbit opportunity is reached, the IUS computer will send the signal to ignite the first-stage motor. After firing approximately 150 seconds, the IUS first stage will have expended its fuel and will be separated from the IUS second stage.

Approximately 2.5 minutes after first-stage burnout, the second-stage motor will be ignited, thrusting about 108 seconds. The IUS second stage will then separate and perform a final collision/contamination avoidance maneuver before deactivating.

The IUS was developed and built by Boeing Aerospace, Seattle, under contract to the Air Force Systems Command's Space Systems Division. The Space Systems Division is executive agent for all Department of Defense activities pertaining to the Space Shuttle system and provides the IUS to NASA for Shuttle use.

MESOSCALE LIGHTNING EXPERIMENT

The Mesoscale Lightning Experiment (MLE) is designed to obtain nighttime images of lightning in an attempt to better understand what effects lightning discharges have on each other, on nearby storm systems, on storm microbursts and wind patterns, and other interrelationships over an extremely large geographical area. This information could lead to better Earth weather prediction models for use in airline operations and such applications as lightning early warning systems for outdoor crews of oil derricks, electrical power companies, large cranes and construction equipment.

In recent years, NASA has used high-altitude U-2 aircraft instrumented to conduct atmospheric and electricity research over the tops of active thunderstorms. The objectives of these flights have been to determine some of the baseline design requirements for a satellite-borne optical lightning mapper sensor, to study the overall optical and electrical characteristics of lightning as viewed from above cloudtops and to investigate the relationship between storm electrical development and the structure, dynamics and evolution of thunderstorms and thunderstorm systems.

Since scientists largely have satisfied the need to acquire a quantitative data base for design of a lightning mapper sensor, the lightning research goals now focus primarily on characterizing the types of optical and electrical signals it produces.

As such, many of the U-2 flights have been coordinated with large ground-based meteorological centers and satellites to gather data on lightning using doppler and conventional radar, ground-based and airborne electricity and microphysical observations, detailed precipitation measurements, ground strike lightning mapping, and visible and infrared Geosynchronous Operational Environmental Satellite images.

Electric field meters and conductivity probes have been added recently to the U-2 instrument package to measure electric fields and conductivity. This provides a means to estimate the current flowing from a thunderstorm to the ionosphere. But optically, the area photographed by an aircraft is limited by the maximum height it can fly. To document large or mesoscale areas, video must be obtained from satellites or the Space Shuttle.

The MLE will employ Shuttle payload bay cameras to observe lightning discharges at night from active storms. Using the Shuttle's payload bay color video camera augmented by a 35mm handheld still picture camera with 400 ASA film, the Shuttle cameras' 40-degree field of vision will cover an area rougly 200 by 150 nautical miles directly below the Shuttle.

Astronauts also will document mesoscale storm systems that are oblique to the Shuttle but near NASA ground-based lightning detection facilities at Marshall Space Flight Center, Huntsville, Ala., Kennedy Space Center, Fla. and the National Oceanic and Atmospheric Administration's Severe Storms Laboratory, Norman, Okla.

The Shuttle payload bay camera system will be stationary, pointed directly below the orbiter. The imagery will be analyzed for the frequency of flashes, the size of the lightning and its brightness.

Experiment investigators will analyze the lightning data taken from the Shuttle as well as information from the ground-based lightning detection network. Otha H. Vaughan, Jr., is principal investigator. Co-investigators are Dr. Bernard Vonnegut, State University of New York, Albany; Dr. Marx Brook, New Mexico Institute of Mining and Technology, Socorro; and Dr. Richard Blakeslee, Marshall Space Flight Center. Gregory Wilson is the Marshall mission manager.

MICROGRAVITY RESEARCH WITH THE FLUIDS EXPERIMENT APPARATUS

Rockwell International, through its Space Transportation Systems Division, Downey, Calif., is engaged in a joint endeavor
agreement (JEA) with NASA's Office of Commercial Programs in the field for floating zone crystal growth research. The agreement, signed on March 17, 1987, provides for microgravity experiments to be performed in the company's microgravity laboratory, the Fluids Experiment Apparatus (FEA), on two Space shuttle missions.

Under the sponsorship of the NASA Office of Commercial Programs, the FEA will fly aboard Atlantis on STS-30. Rockwell's Space Transportation Systems Division is responsibe for developing the FEA hardware and for integrating the experiment payload. Rockwell's Science Center in Thousand Oaks, Calif., has the responsibility for developing the materials science experiments and for analyzing their results.

The Indium Corporation of America of Utica, New York is collaborating with the Science Center in the development and analysis of the experiments and is providing the three Indium samples to be processed on the FEA-2 Mission. NASA will provide standard Space Shuttle flight services under the JEA.

Floating Zone Crystal Growth and Purification

The floating zone process involves an annular heater that melts a length of sample material and them moves along the sample. As the heater moves (translates), more and more of the polycrystalline material in front of it melts. The molten material behind the heater will cool and resolidify.

The presence of a "seed" crystal at the initial solidification interface, will establish the crytallographic lattice structure and orientation of the single crystal that results. Impurities in the polycrystalline material will tend to stay in the melt as it passes along the sample and will be deposited at the end when the heater is turned off and the melt finally solidifies.

On the ground, under the influence of gravity, the length of the melt is dependent upon the density and surface tension of the material being processed. Many industrially important materials cannot be successfully processed because of their properties. In the microgravity environment of spaceflight, the length of the melt is only limited to the diameter of the sample and is independent of material properties.

Materials of industrial interest include indium antimonide, cadmium telluride, gallium arsenide and others. Potential applications for these materials include advanced electronic, electo-optical and optical devices and high-purity feed stock.

The FEA-2 experiments involve five samples, three of indium with a melting point of 156 Celsius and two of selenium with a melting point of 217 Celsius. Each sample will be 1 centimeter in diameter by 19 centimeters long. The heater translation rates and process durations are given by the table on the next page.

Sample	Material	Heater Rate (centimeters/hours)	Duration (hours)
1	indium	0	2
2	indium	0	2
3	indium	1.25	16
4	selenium	1.25	16
5	selenium	0.62	16

On orbit, the flight crew will prepare the FEA by connecting its computer and camera. The five experiment samples will be sequentially installed in the FEA at mission elapsed times of 21.5, 25.9, 30.1, 51.9 and 73.5 hours, respectively, and processed according to their unique requirements. The experiment parameters (heater power and translation rate) will be controlled by the operator through the FEA control panel.

Sample behavior, primarily melt zone length, will be observed by the operator and recorded by the FEA camera. Experiment data (heater power, heater translation rate, heater position, experiment time, and various experiment and FEA temperatures) will be formatted, displayed to the operator and recorded by the computer. The operator will record mission elapsed time at the start of each experiment as well as significant orbiter maneuvers during FEA operations.

In general, the experiment process involves installing a sample in the FEA, positioning the heater at a predesignated point along the sample, turning on the heater to melt a length of sample (approximately twice the diameter), starting the heater translation at a fixed rate (for the last three samples only), and maintaining a constant the melt zone length by controlling the heater power.

Once the end of the sample is reached, the heater is turned off and the translation reversed until it reaches the starting end of the sample. The sample, camera film and computer disk then can be changed and the next experiment started.

Fluids Experiment Apparatus (FEA)

The FEA is designed to perform materials processing research in the microgravity environment of spaceflight. Its design and operational characteristics are based on actual industrial requirements and have been coordinated thoroughly with industrial scientists and NASA materials-processing specialists and Space Shuttle operations personnel. Convenient, low-cost access to space for basic and applied research in a variety of product and process technologies is provided by the FEA.

The FEA is a modular microgravity chemistry and physics laboratory for use on the Space Shuttle and supports materials processing research in crystal growth, general liquid chemistry, fluid physics and thermodynamics. It has the functional capability to heat, cool, mix, stir or centrifuge experiment samples that can be gaseous, liquid or solid. Samples can be processed in a variety of containers or in a semicontainerless floating zone mode. Multiple samples can be installed, removed or exchanged during a mission through a 14.1 by 10 inch door in the FEA's cover.

Instrumentation can measure sample temperature, pressure, viscosity, etc. A video or super-8 millimeter movie camera can be used to record sample behavior. Experiment data can be displayed and recorded through the use of a portable computer that also is capable of controlling experiments.

Interior dimensions of the FEA are approximately 18.6 by 14.5 by 7.4 inches, and it can accommodate approximately 26 pounds of experiment-unique hardware and subsystems. It mounts in place of a standard stowage locker in the middeck of the Shuttle crew compartment, where it is operated by the flight crew. This installation and means of operation permit the FEA to be flown on most Space Shuttle missions.

Modular design permits the FEA to be easily configured for almost any experiment. Configurations even can be changed in orbit, permitting experiments of different types to be performed on a given Shuttle mission. Optional subsystems can include custom furnace and oven designs, special sample containers, low-temperature air heaters, specimen centrifuge, special instrumentation, and other systems specified by the user. Up to 100 watts of 120 volt, 400-hertz power is available from the Shuttle orbiter for FEA experiments.

AIR FORCE MAUI OPTICAL SITE CALIBRATION TEST

The Air Force Maui Optical Site (AMOS) tests allow ground-based electro-optical sensors located on Mt. Haleakala, Maui, Hawaii, to collect imagery and signature data of the orbiter during cooperative overflights. The scientific observations made of the orbiter, while performing reaction control system thruster firings, water dumps or payload bay light activation, are used to support calibration of the AMOS sensors and the validation of spacecraft contamination models. The AMOS tests have no payload-unique flight hardware and only require that the orbiter be in predefined attitude operations and lighting conditions.

The AMOS facility was developed by the Air Force Systems Command (AFSC) through its Rome Air Development Center, Griffiss Air Force Base, N.Y., and is administered and operated by the AVCO Everett Research Laboratory in Maui. The principal investigator for the AMOS tests on the Space Shuttle is from AFSC's Air Force Geophysics Laboratory, Hanscom Air Force Base, Mass. A co-principal investigator is from AVCO.

Flight planning and mission support activities for the AMOS test opportunities are provided by a detachment of AFSC's Space Systems Division at Johnson Space Center. Flight operations are conducted at JSC Mission Control Center in coordination with the AMOS facilities located in Hawaii.

PAYLOAD AND VEHICLE WEIGHTS

Vehicle/Payload	Weight (Pounds)
Orbiter Atlantis (Empty)	171,600
Magellan/IUS	45,748
DSO	6
FEA	128
IUS Support Equipment	204
MLE	31
Orbiter and Cargo at SRB Ignition	217,513
Total Vehicle at SRB Ignition	4,525,116
Orbiter Landing Weight	192,313

NASA

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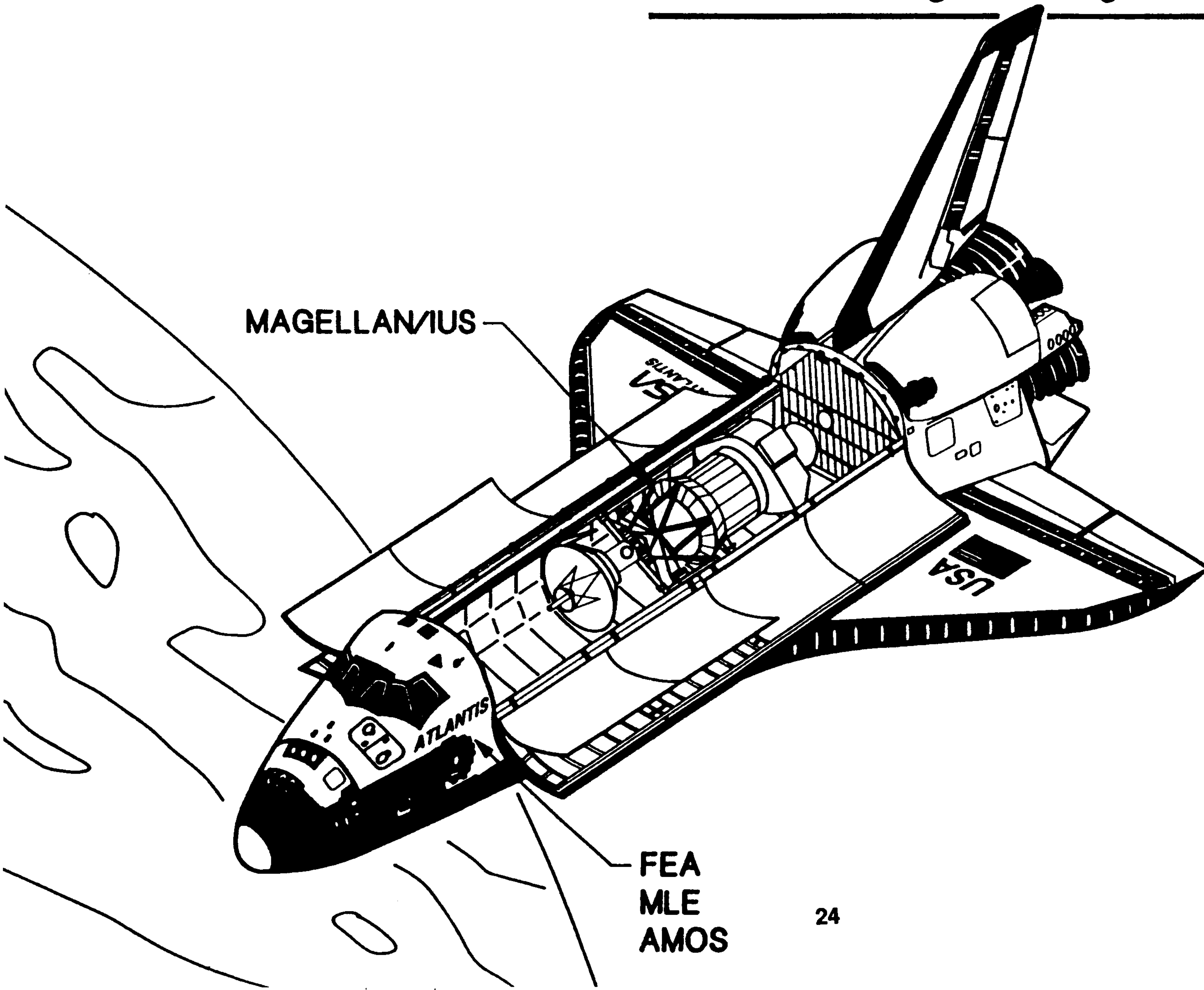
National STS Program
STS-30 Cargo Configuration



SPACEFLIGHT TRACKING AND DATA NETWORK

Primary communications for most activities on STS-30 will be conducted through the Tracking and Data Relay Satellite System (TDRSS). However, the NASA Spaceflight Tracking and Data Relay Network of ground stations will continue to play a role in the mission. The stations, along with the NASA Communications Network, at Goddard Space Flight Center in Greenbelt, Md., will serve as backups for communications with Space Shuttle Atlantis should a problem develop in the satellite communications.

Ground tracking facilities serve as focal points during the launch and ascent of the Shuttle from Kennedy Space Center, Fla. For the first minute and 20 seconds, all voice, telemetry and other communications from the Shuttle are relayed to the mission managers at Kennedy and at Johnson Space Center, Houston, by the Merritt Island facility.

At 1 minute, 20 seconds, the communications are picked up from the Shuttle and relayed to KSC and JSC from the Ponce de Leon facility, 30 miles north of the launch pad. This facility provides the communications for 70 seconds during a critical period when exhaust energy from the solid rocket motors "blocks out" the Merritt Island antennas.

The Merritt Island facility resumes communications to and from the Shuttle after those 70 seconds and maintains them until 6 minutes, 30 seconds after launch when communications are "switched over" to Bermuda. Bermuda then provides the communications until 11 minutes after liftoff. At that time, TDRS-East acquires the satellite.

With the completion of the TDRS constellation of three satellites on mission STS-29 in March, plans are underway to phase out five of the ground stations. They are Guam, after June 30, 1989; Ascension Island, Hawaii and Santiago, Chile, after Sept. 30, 1989; and Dakar, Senegal, on Dec. 30, 1990. After these stations are closed, the Merritt Island, Ponce de Leon, Bermuda and Wallops Island, Va., stations will remain in operation.

CREW BIOGRAPHIES

DAVID M. WALKER, 44, captain, USN, is mission commander. Although born in Columbus, Ga., he considers Eustis, Fla., his hometown. Walker is a member of the astronaut class of 1978.

Walker was pilot of STS-51A, launched Nov. 8, 1984, marking the second flight of the orbiter Discovery. During the mission, the crew deployed two satellites and, in the first space salvage mission in history, also retrieved and returned to Earth the Palapa B-2 and Westar VI satellites.

His assignments also have included: Astronaut Office safety officer; deputy chief of Aircraft Operations; STS-1 chase pilot; software verification at the Shuttle Avionics Integration Laboratory (SAIL); and assistant to the director, Flight Crew Operations. He has logged 192 hours in space.

Walker earned a B.S. degree from the U.S. Naval Academy in 1966. He received flight training from the Naval Aviation Training Command at bases in Florida, Mississippi and Texas. He completed two combat cruises in Southeast Asia as a fighter pilot, flying F-4 Phantoms aboard the carriers USS Enterprise and USS America.

In January 1972, Walker became an experimental and engineering test pilot in the flight test division at the Naval Air Test Center, Patuxent River, Md. Walker has logged more than 5,000 hours flying time, 4,500 in jet aircraft.

RONALD J. GRABE, 43, colonel, USAF, is pilot. He was born in New York, N.Y., and is a member of the astronaut class of 1981. Grabe was pilot for STS-51J, the second Space Shuttle Department of Defense mission, launched Oct. 3, 1985, on the orbiter Atlantis' maiden voyage. He has logged 98 hours in space.

Grabe earned a B.S. degree in engineering science from the U.S. Air Force Academy in 1966 and studied aeronautics as a Fulbright Scholar at the Technische Hochschule, Darmstadt, West Germany, in 1967.

Following his studies in West Germany, Grabe returned to the United States to complete pilot training at Randolph Air Force Base, Texas. In 1969, he was assigned as an F-100 pilot with the 3rd Tactical Fighter Wing at Bien Hoa Air Base, Republic of Vietnam, where he flew 200 combat missions.

Grabe graduated from the USAF Test Pilot School in 1975 and was assigned to the Air Force Flight Test Center as a test pilot for the A-7 and F-111. He later served as an exchange test pilot with the Royal Air Force at Boscombe Down, United Kingdom, from 1976 at Edwards Air Force Base, Calif., when advised of his selection by NASA. Grabe has logged more than 4,000 hours flying time.

NORMAN E. THAGARD, M.D., 45, is mission specialist 1 (MS-1). Although born in Marianna, Fla., Thagard considers Jacksonville, Fla., his hometown. He is a member of the astronaut class of 1978.

Thagard was a mission specialist on STS-7, launched June 8, 1983. It was the second flight for the orbiter Challenger and the first mission with a five-person crew. During the mission, the STS-7 crew operated the Canadian-built remote manipulator system arm to perform the first deployment and retrieval exercise with the Shuttle Pallet Satellite (SPAS-01); conducted the first formation flying of the orbiter with a free-flying satellite (SPAS-01); and carried and operated the first U.S./German cooperative materials science payload. During the flight, Thagard conducted various medical tests and collected data on physiological changes associated with astronaut adaptation to space.

Thagard also served as a mission specialist on STS-51B, the Spacelab-3 science mission, launched April 29, 1985, aboard Challenger. Duties on orbit included satellite deployment operation with the NUSAT satellite and care for the 24 rodents and two squirrel monkeys contained in the Research Animal Holding Facility.

Thagard earned B.S. and M.S. degrees in engineering science from Florida State Univeristy before earning an M.D. degree from the University of Texas Southwestern Medical School in 1977.

After entering active duty with the U.S. Marine Corps Reserve, Thagard achieved the rank of captain in 1967 and a year later was designated a naval aviator assigned to fly F-4s at Marine Corps Air Station, Beaufort, S.C. He flew 163 combat missions in Vietnam in 1969 and 1970. Thagard resumed his academic studies in 1971, pursuing additional studies in electrical engineering and a degree in medicine.

Thagard is a pilot and has logged over 2,200 hours flying time, the majority in jet aircraft.

MARY L. CLEAVE, Ph.D., 42, is mission specialist 2 (MS-2). Cleave was born in Southampton, N.Y. She is a member of the astronaut class of 1980.

Cleave was a mission specialist on STS-61B which was launched at night, Nov. 26, 1985. During the mission, the crew deployed communications satellites and conducted two 6-hour spacewalks to demonstrate Space Station construction techniques with the EASE/ACCESS experiments. This was the heaviest payload weight a Space Shuttle had carried to orbit. Cleave also has worked as a capsule communicator (capcom) in the Mission Control Center on five Space Shuttle flights. Cleave has logged 165 hours in space.

Cleave earned a B.S. degree in biological sciences from Colorado State University in 1969. She earned an M.S. degree in microbial ecology and a Ph.D. in civil and environmental engineering from Utah State University in 1975 and 1979, respectively.

Cleave held graduate research, research phycologist and research engineer assignments in the Ecology Center and the Utah Water Research Laboratory at Utah State University from 1971 to 1980.

MARK C. LEE, 36, major, USAF, is mission specialist 3 (MS-3). This will be his first space flight. Born in Viroqua, Wis., he is a member of the astronaut class of 1984.

Lee has participated in the planning and simulation of several extravehicular activity missions and has served as the support crewmember for mission STS-51I, Leasat retrieval and repair. He also has served as a capcom.

Lee earned a B.S. degree in civil engineering from the U.S. Air Force Academy in 1974 and a M.S. degree in mechanical engineering from Massachusetts Institute of Technology in 1980.

Following pilot training at Laughlin Air Force Base, Texas, Lee spent 2 1/2 years at Okinawa Air Base, Japan, in the 25th Tactical Fighter Squadron flying F-4s. In 1982, he served as the 388TFW deputy commander for operations, executive officer and flight commander in the 4th Tactical Fighter Squadron at Hill Air Force Base, Utah, until his selection as an astronaut candidate. Lee has logged 2,000 hours flying time, primarily in the T-38, F-4 and F-16 aircraft.

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Director, Payload Management and Operations

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Manager, Solid Rocket Booster Project

Joseph A. Lombardo
Manager, Space Shuttle Main
Engine Project

Jerry W. Smelser
Acting Manager, External Tank Project

Stennis Space Center
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Anthony J. Spear
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Manager, Science and Mission Design,
Magellan Project

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Magellan Project Scientist

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

April 10, 1989

Nancy Lovato
Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE: 89-47

NASA PLANS F-16XL SUSTAINED-SUPERSONIC AIRFLOW RESEARCH TESTS

NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., has taken delivery of the first of two U.S. Air Force-loaned F-16XL aircraft for a NASA flight research program. The second aircraft will be delivered in several weeks.

The F-16XL aircraft is uniquely characterized by it's large cranked-arrow wing, especially well suited for efficient supersonic flight. The aircraft will be used by NASA as testbeds to evaluate aerodynamic concepts designed to improve wing airflow during sustained supersonic flight.

Current aircraft designs, both subsonic and supersonic, result in turbulent airflow over the wing, air drag and reduced aircraft fuel efficiency. An aircraft's fuel consumption can be significantly improved if this airflow over the wing is maintained in a laminar (non-turbulent) condition. NASA has established the feasibility of laminar flow control technology by designing and flying several experiments demonstrating laminar flow over parts of a wing at subsonic speeds.

The initial experiments with the F-16XL aircraft will focus on concepts to achieve significant amounts of laminar air flow on the wing at supersonic speeds. This information is expected to aid in the design of future high speed aircraft.

An experimental wing section will be installed which is perforated with thousands of tiny, laser-cut holes connected to an air pump mounted in the fuselage. The pump's suction will remove the turbulent layer of air next to the wing's surface, establishing laminar air flow. Instrumentation will acquire the flight data to validate the computer codes used to design the experiment and to quantify the experiment results.

- end -

National Aeronautics and
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For Release:

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April 12, 1989

Jean Drummond Clough
Langley Research Center, Hampton, Va.
(Phone: 804/864-6122)

RELEASE: 89-48

NASA CONDUCTS FIRST GLOBAL SURFACE RADIATION BUDGET EXPERIMENT

The National Aeronautics and Space Administration is conducting the first Global Surface Radiation Budget (SRB) satellite data validation experiment to measure solar and thermal radiation reaching the ocean and land surfaces under all types of clouds. These measurements will be used to confirm the accuracy of satellite information by testing various satellite data reduction techniques.

The purpose of the experiment, which is part of the World Climate Research Program, is to obtain a special set of high-quality data from a number of ground-based verification sites, known as ground-truth sites, during April. Each of these sites is making local measurements from horizon to horizon.

Since approximately 70 percent of the globe is ocean, it is essential that ground-truth data at several ocean sites be obtained. Measurements are being obtained from Bermuda; Canada; Alaska; Switzerland; Australia; the South Pole and Antarctic coast; Kwajalein Island and American Samoa in the South Pacific; White Sands, N.M.; and Boulder, Colo. These measurements are being collected by NASA, the National Oceanic and Atmospheric Administration (NOAA), U.S. Army, Canadian Atmospheric Environmental Service, and environmental agencies in Italy, Australia and Switzerland.

Previous measurements from some islands may not be accurate because of local effects. If the elevation of the island is more than several hundred feet, local clouds are formed that can adversely affect any results. Islands with suitable elevation include the atolls in the Pacific and Bermuda in the North Atlantic.

- more -

NASA's Langley Research Center, Hampton, Va., has the lead role in the NASA's Earth radiation budget program and is responsible for the United States' part of the global SRB experiment. Langley elected to conduct an SRB ground-truth experiment at the NASA tracking station on Bermuda because cloud climatology over the island is expected to be identical to that of the surrounding deep ocean during the month of April.

The experiment involves launching approximately 120 small weather balloons from the U.S. Naval Air Station Annex on Bermuda, locating solar/thermal instrument packages at the Naval Air Station Annex and the NASA tracking station and locating two lidar (light detection and ranging) systems at the NASA tracking station.

Up to four standard Vaisala weather balloons are launched each day to obtain vertical profiles of temperature and humidity. Launch times coincide with overpasses of the NOAA polar orbiter satellite at approximately 2 a.m. and 7 p.m. local standard time.

There are three solar/thermal instrument packages used in the Bermuda experiment. The packages are about 1-foot square, weigh about 40 pounds and attach to a standard personal computer for instrument monitoring and data storage. These devices are passive and do not transmit any radio signals.

According to Dr. Charles H. Whitlock, principal investigator for the experiment, "Langley's instruments should obtain the most accurate open-ocean SRB and cloud measurements that have ever been made. These data are expected to play a significant role in the validation methods to determine the global SRB.

"Clouds in any portion of the sky have an influence on both the solar and thermal measurements," explained Whitlock, "so measurements are required to diagnose causes of inaccuracies which may exist in the satellite SRB determination." Whitlock said cloud heights are being measured by two devices: Low-altitude clouds (less than 12,000 feet) are measured using a Vaisala ceilometer, which is operated 24 hours a day by the National Weather Service. High-altitude clouds (up to 50,000 feet) are observed using a custom-built lidar.

The Bermuda stations are taking solar and thermal data every minute in conjunction with the two lidar systems and weather balloons. Bermuda is a dry maritime atmosphere while both Kwajalein Island and American Samoa are wet maritime atmospheres. Switzerland is collecting mountain data; the South Pole, Antarctic coast, Alaska and Northern Canada sites are collecting polar data; White Sands is collecting desert measurements; Boulder is collecting high plains data; and other parts of Canada are collecting variable-latitude data.

- more -

Langley has established a Satellite Data Analysis Center (SDAC) as part of the World Climate Research Program. The satellite and ground-truth data received during the global SRB experiment will be synthesized and analyzed by the SDAC and distributed to investigators for regional validation studies. Regional studies will be conducted for each of the surface data sets around the globe. The ultimate goal of the experiment is to publish global maps showing the balance of the surface radiation energy coming from the sun and emitted from the Earth.

This first global experiment is sponsored by the Office of Space Science and Applications at NASA Headquarters, Washington, D.C. Dr. Robert A. Schiffer is the project scientist for NASA's climate program and is head, radiation projects for WCRP. In addition to the Langley Research Center, NASA's Goddard Space Flight Center, Greenbelt, Md., and NASA's Ames Research Center, Moffett Field, Calif., are participating in the project. Langley engineers associated with the experiment in Bermuda are Whitlock, Dr. John T. Suttles, Gerald C. Purgold, Jose M. Alvarez and Bill M. Rouse of the Atmospheric Sciences Division. They are supported by personnel from the Planning Research Corp. and ST Corp., both of Hampton, Va.

- end -

NOTE TO EDITORS: A video to accompany this release will be available April 13 from the Broadcast and Audio Visual Branch at NASA Headquarters, Washington, D.C., 202-453-8374.

NASA News

National Aeronautics and Space Administration

Washington, D.C. 20546
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For Release:

April 13, 1989

N89-32 EDITORS NOTE: STS-30 PRESS BRIEFING SCHEDULE

The press briefing schedule is listed below for the STS-30 Space Shuttle mission currently targeted for an April 28 launch. All briefings will be available on NASA Select TV (Satcom F-2R, transponder 13, 72 degrees west longitude, 39.60.0 MHz, audio monaural 6.8 MHz). A detailed list of participants will be provided at NASA news centers on each briefing day. All briefing times and participants are subject to change.

TIME (EST)	BRIEFING	ORIGIN
L-3 Days		
9 a.m.	Launch Countdown Status	KSC
L-2 Days		
9 a.m.	Launch Countdown Status	KSC
9:30 a.m.	Magellan/IUS	KSC
10:30 a.m.	Fluids Experiment Apparatus	KSC
11:30 a.m.	Mesoscale Lightning Experiment	KSC
L-1 Day		
9 a.m.	Launch Countdown Status	KSC
1 p.m.	Pre-Launch Press Conference	KSC
Launch Day		
Launch +1 Hr	Post-Launch Briefing	KSC
Launch Through End-of-Mission		
Times for flight director change-of-shift briefings announced on NASA Select television		
Landing Day		
Land +1.5 Hrs	Post-Landing Press Conference	DFRF
Land +3-4 Hrs	Crew Departure (Open press coverage; no Q&A)	DFRF

- end -

National Aeronautics and
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For Release:

April 13, 1989

RELEASE: 89-49

ACTING NASA ADMINISTRATOR TO RESIGN

Dale D. Myers, the acting NASA administrator, has announced his plans to resign effective May 13, 1989.

Myers, acting administrator since April 8, 1989, served as the NASA deputy administrator from Oct. 6, 1986, when he was called back to NASA by President Reagan. During this tenure, Myers was instrumental in guiding NASA through the period of recovery following the Challenger accident of Jan. 28, 1986.

Some major accomplishments during this period were the substantial redesign of the Space Shuttle system including the solid rocket motor and the subsequent return to manned space flight in September 1988; reorganizing the Space Shuttle management structure and centralizing the Space Station management; and the reinstitution of a mixed fleet strategy using commercial expendable launch vehicles in addition to the Shuttle.

In his letter of resignation to President Bush, Myers wrote, "I am most grateful for the opportunity to be of service to the Nation. I will continue to support you and this administration to the best of my ability in the years to come."

Myers has served two tours at NASA Headquarters -- his present position and earlier as the associate administrator for manned space flight from 1970 to 1974. He also served as under secretary, U.S. Department of Energy from 1977 to 1979. From 1974 to 1977, he was vice-president, Rockwell International, and president, North American Aircraft, El Segundo, Calif.

Born on Jan. 8, 1922 in Kansas City, Mo., Myers is a graduate of the University of Washington, Seattle, with a B.S. in aeronautical engineering. He received an honorary doctorate from Whitworth College, Spokane, Wash., and distinguished service medals from both NASA and the Energy Department. He was elected to the National Academy of Engineering in 1974.

- more -

Myers is married to the former Marjorie Williams of Seattle and they are the parents of two daughters.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
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For Release

April 14, 1989

LAUNCH ADVISORY: NASA SETS LAUNCH DATE FOR NEXT SHUTTLE MISSION

Admiral Richard H. Truly, NASA associate administrator for space flight, today set a launch date of April 28, 1989 for STS-30. "We have completed a 2-day flight readiness review in preparation for the STS-30 launch of the Space Shuttle Atlantis, whose mission is to send the Magellan spacecraft to the planet Venus. While we have much work to do, and little contingency time, we have established an April 28 launch date, which is the opening day of the Magellan window." The launch window begins at 2:24 p.m. EDT and runs for 23 minutes.

At the conclusion of the meeting, Admiral Truly said, "I would like to emphasize the excellent job done by the entire government/industry team that has brought us to this point in our preparations for this mission, which is of such importance to America's space science program,"

The STS-30 crew is David M. Walker, commander; Ronald J. Grabe, pilot; Norman E. Thagard, Mary L. Cleave and Mark C. Lee, mission specialists.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
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Jim Ball
Headquarters, Washington, D.C.
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For Release
April 17, 1989

N89-34: COMMERCIAL SOUNDING ROCKET PRESS BRIEFING SET APRIL 21

NASA will hold a press conference at 12:30 p.m., Friday, April 21, to discuss the experiment results from the March 29 commercial sounding rocket launch at White Sands Missile Range and plans for NASA support of additional commercially-provided flights.

The Consort 1 mission, developed and managed by a NASA Center for the Commercial Development of Space located at the University of Alabama-Huntsville, was launched on a privately furnished rocket in the first federally-licensed commercial launch by a U.S. firm.

Participants will include James T. Rose, NASA assistant administrator for commercial programs; Dr. Francis Wessling, associate director, consortium for materials development in space at the University of Alabama-Huntsville; and Donald K. "Deke" Slayton, Space Services Inc., Houston.

The press conference will be conducted in the 6th floor auditorium, NASA Headquarters, 400 Maryland Ave., S.W., Washington, D.C.

The briefing will be carried live by NASA Select television on Satcom F2R, Transponder 13, at 72 degrees west longitude, with interactive question-and-answer capability.

- end -

National Aeronautics and
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For Release:

April 17, 1989

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Jeffrey Carr
Johnson Space Center, Houston
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RELEASE: 89-50

DEADLINE SET FOR NEXT ASTRONAUT SELECTION

Applications received by NASA on or before June 30, 1989 will be considered in the next astronaut candidate selection, now planned for early 1990. The selection will be the first in the regular 2-year selection cycle announced last year.

After 6 months of screening, medical evaluations and interviews, the astronaut candidate class of 1990 will be announced in January, and candidates will report to the Johnson Space Center, Houston, in July.

NASA will continue to accept and review applications from the general public on an ongoing basis. Those received after June 30 will be eligible for consideration in the 1992 selection. The number of selections made every 2 years will be based on projected requirements.

Applications can be obtained by writing to the following address:

NASA, Lyndon B. Johnson Space Center
Astronaut Selection Office
ATTN: AHX
Houston, Texas 77058.

Applicants must be citizens of the United States.

\- end -

National Aeronautics and
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Washington, D.C. 20546
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For Release:

April 18, 1989

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Mark Hess
Headquarters, Washington, D.C.
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Karl Kristofferson
Kennedy Space Center, Fla.
(Phone: 407/867-2468)

RELEASE: 89-51

HARRIS CORP. SELECTED TO NEGOTIATE MAJOR KSC COMPUTER UPGRADE

NASA's John F. Kennedy Space Center (KSC), Fla., has selected the Harris Corp., Melbourne, Fla., for negotiations leading to the award of a contract to provide new computer systems for processing and launch activities involving NASA's Space Station Freedom and Space Transportation System.

The proposed cost and fee for the basic contract is approximately $171 million, and with all options, approximately $200 million. The period of performance for the cost-plus-award-fee contract is July 1, 1989, to Sept. 30, 1996.

Under contract terms, Harris Corp. will provide management; engineering; and hardware and software for new state-of-the-art, real-time computer systems for processing flight hardware.

Initial applications will involve installation of a Test, Control and Monitor System (TCMS) for space station operations, and replacement of the present Checkout, Control and Monitor (CCMS) System, which is a major component of KSC's Launch Processing System.

The TCMS, to be installed in KSC's planned Space Station Processing Facility, will be used to process and check out various Space Station Freedom elements and experiments. The CCMS, located in the Launch Control Center, automatically controls and performs much of the Space Shuttle vehicle processing, countdown and launch operations.

-more-

Additional bidders for the contract were Lockheed Space Operations Co., Titusville, Fla., and Martin Marietta, Denver, Colo.

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National Aeronautics and
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For Release:
April 19, 1989

RELEASE: 89-52

NASA ASTRONOMER DISCOVERS "NEAR-MISS" ASTEROID THAT PASSED EARTH

An asteroid, a half-mile or more in diameter, passed within a half million miles of the Earth - about twice the distance to the moon - on March 23, the National Aeronautics and Space Administration said today.

"On the cosmic scale of things, that was a close call," said Dr. Henry Holt. Holt is a University of Arizona astronomer who discovered the asteroid while working on a U.S. Geological Survey (USGS) project, funded by NASA, to detect and track unknown asteroids that cross the orbit of the Earth. The project is headed by Dr. Eugene Shoemaker, USGS.

Dr. Bevan French, advanced program scientist for NASA's Solar System Exploration Division, Washington, D.C., said that if the asteroid had collided with the Earth, the impact would have been equivalent to the explosion of 20,000 hydrogen bombs creating a crater 5 to 10 miles in diameter - "enough to destroy a good-sized city." Landing in the ocean could have been worse since huge tidal waves could have been created that would sweep over coastal regions, he said.

Although scientists do not know the asteroid's exact size, they believe it to be over a half-mile in diameter. A 6-mile-diameter asteroid hit the Earth about 65 million years ago. It is popularly believed that this caused a global catastrophe that destroyed the dinosaurs.

The asteroid, currently designated 1989FC, came closer to Earth than any recorded since Hermes in 1937, according to Dr. Brian Marsden, director of the Minor Planets Center at the Smithsonian Astrophysical Observatory, Cambridge, Mass. Hermes passed the Earth at approximately the same distance as 1989FC.

- more -

The observatory, which is the international clearinghouse for such discoveries, recorded the discoveries of about 1,800 asteroids in 1988. In the designation 1989FC, 1989 is the year of discovery; F indicates discovery in the sixth half-month of the year (i.e. the end of March); C indicates that the asteroid was the third discovered in that period. If the asteroid is successfully observed on two subsequent approaches to Earth, Holt will be entitled to name it.

Holt discovered the asteroid on a series of photographic plates taken March 31 using the 18-inch Schmidt telescope at the California Institute of Technology's Mount Palomar Observatory in California.

The object - estimated to be travelling 46,000 miles an hour - appeared as a trail of light in two photographs of the sky near the constellation Coma Berenices. They were taken an hour apart. The asteroid was detected when the two photographic plates were examined under a stereo microscope. "I knew it was travelling fast by the elliptical spot that it created," said Holt.

During the week following the discovery, subsequent observations of 1989FC were made by Holt and other astronomers to determine its orbit. Like the Earth, 1989FC takes about a year to go around the Sun. But its orbit is highly elliptical and extends past the orbit of Mars and inward past the orbit of Venus. Asteroid 1989FC is now moving rapidly away from the Earth and Sun. It will return, crossing the Earth's orbit again in early October 1989, this time at a greater distance from Earth.

Asteroid 1989FC is only one of about 30 Earth-crossing asteroids that have been discovered, although there may be many more. Estimates range from several hundred to more than a thousand. Holt and Shoemaker regularly observe the sky during the "dark of the moon," the period just before and just after the new moon.

- end -

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April 19, 1989

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Goddard/Wallops Flight Facility, Wallops Island, Va.
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RELEASE: 89-53

NASA AIRCRAFT TO SUPPORT INTERNATIONAL GLOBAL OCEAN STUDY

NASA's highly instrumented, remote sensing aircraft will participate in an international oceanographic experiment, called the Global Ocean Flux Study (GOFS), to determine the capacity of the world's oceans to assimilate and store excess carbon dioxide (CO_2) from Earth's atmosphere.

The study results are critical to predicting potential temperature increases in world climate due to the large increase in atmospheric CO_2 caused by the burning of fossil fuels. The increased atmospheric carbon dioxide may lead to a warmer Earth through the "greenhouse effect."

The ocean is an important reservoir for CO_2. Some estimates indicate that the ocean has absorbed nearly half of the increased CO_2 produced. Additionally, CO_2 constantly is being exchanged between the ocean and atmosphere. A vital input needed for climactic research is predicting the portion of the CO_2 entering the ocean that will be effectively trapped or removed.

In polar regions, the cold ocean surface layer sinks in some areas and becomes part of deep ocean bottom water where the entrained CO_2 is effectively removed from contact with the atmosphere for long periods of time.

A second important process is removal of CO_2 by biological processes. Carbon dioxide from the surface layer is utilized in the marine photosynthetic process where CO_2 is combined with water to form biomass. Some of this biomass is consumed in the marine food chain where a portion is released back into the water column and potentially, to the atmosphere through respiration.

- more -

An unknown amount of plant and animal biomass sinks through the water column to the sea floor. Knowledge of these processes and rates also will provide scientists with information to make improved estimates of climactic changes.

The NASA four-engine, P-3A turboprop aircraft, from Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va., is equipped to measure the concentration of phytoplankton biomass in the upper ocean layer. The primary instrument, the airborne oceanographic lidar (AOL), will use a blue-green laser to stimulate fluorescence from chlorophyll contained in phytoplankton, the microscopic plants at the bottom of the marine food web.

Previous aircraft chlorophyll fluorescence measurements have been shown to be highly correlated with chlorophyll concentration measurements made on board ships with standard pigment extraction techniques. In addition, other instrumentation associated with the AOL will be used to measure solar induced responses associated with phytoplankton in numerous bands spread across the entire visible spectrum.

Over the past decade, remote-sensing scientists have been increasingly successful in deriving reliable chlorophyll concentration values from certain combinations of these passive spectral bands. The combination of laser-induced fluorescence measurements and the passive spectra will be used to further improve the potential for measuring chlorophyll from solar induced ocean color alone.

The Global Ocean Flux Study efforts include scientists and research vessels from West Germany, Canada, Great Britain, the Netherlands and the United States. The study is expected to continue over the next 10 years, each year concentrating on resolving unknown aspects involving the marine carbon and related biogeochemical cycles.

The initial experiment involves studies of the spring phytoplankton bloom in the eastern North Atlantic Ocean. The U.S. research vessel, the Atlantis II from Woods Hole Oceanographic Institute, has placed instrumented moorings at two sites along the 20 west meridian. The Atlantis II, along with research vessels from the other participating nations, will study related phytoplankton productivity as the bloom moves northward in response to increasing solar radiation and the development of thermal stratification in the upper ocean.

The NASA aircraft will participate in the spring bloom study for a 6-week period beginning April 20. The aircraft surveys will be staged from Lajes, Azores; Shannon, Ireland; and Keflavik, Iceland.

The NASA aircraft will be used to map 62 to 124 mile areas of the ocean surrounding each of the moorings. Maps showing the regional concentration of chlorophyll and sea surface temperature will be sent to the research vessels through a satellite transmission.

Knowledge of the distribution of phytoplankton and sea surface temperature will be used by the scientists on board the research vessels to position the ships during the experiment and thus, optimize the time-series sampling conducted from the ships. Following the completion of aircraft deployment, the surface layer chlorophyll maps, developed from the airborne data, will be used to aid in the interpretation of the observations made from the individual research vessels.

Launches of satellite ocean color scanners, proposed for the mid-late 1990's, will enable remote sensing scientists to gauge surface layer phytoplankton and production over wide areas of the ocean on a continual basis, considerably augmenting measurements made from ships and aircraft.

Similar chlorophyll estimates made from the coastal zone color scanner, an ocean scanner on NASA's Nimbus 7 spacecraft which functioned for an 8-year period beginning in 1978, have allowed scientists from Goddard Space Flight Center's Laboratory for Oceans to provide maps of world-wide chlorophyll distribution which have been very valuable in planning the Global Ocean Flux Study.

There currently are no ocean color satellite sensors in orbit. The earliest that such a satellite could be placed in orbit is late in 1992, which is the proposed launch date for the Compact Wide Field Spectrometer ocean color sensor.

- end -

National Aeronautics and
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April 20, 1989

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RELEASE: 89-55

MULTI-COLORED, ARTIFICIAL CLOUD TO BE VISIBLE ALONG EAST COAST

A rocketborne scientific experiment, programmed to create an artificial cloud at high altitudes, is scheduled for launch Sunday evening, April 23, from NASA/Goddard Space Flight Center's Wallops Flight Facility on Virginia's Eastern Shore.

A three-stage suborbital rocket, the Black-Brant X will carry two canisters of barium to be ejected 90 seconds apart at an altitude of about 300 statute miles. The barium will create an artificial greenish-purple cloud which can be visible for approximately 20 minutes to residents, using binoculars, along the U.S. East Coast from Canada to Florida and as far west as Ohio.

The objective of this launch is to investigate Nobel prize winner Dr. Hannes Alfven's critical velocity effect theory, which has been used to explain details in the early formation of the solar system. In 1954, Alfven, University of California, San Diego, proposed that if an element in a nearly neutral plasma became ionized when it attained a flow velocity which depended on its ionization potential, then several facets of the structure of the solar system could be explained. This could explain the differing chemical compositions of the planets and whether they were formed during a gaseous or plasma transition.

The launch is scheduled about 9:40 p.m. EDT from Wallops Island, Va., during a launch window that opens April 23 and extends through May 6. Since the data will be obtained optically, clear weather conditions are required at the ground observing sites in Virginia, Massachusetts and North Carolina. Delays could occur due to operational constraints or cloud cover at the ground-based camera sites so the launch will be scheduled on a day-to-day basis.

- more -

The two canisters of barium will be ejected and detonated -- one as the payload ascends and one as it descends -- thus creating two separate jets of gas near the apogee altitude of 300 miles.

The explosives will simulate the fast-moving gas during the formation of the solar system. Sensors on-board the payload will record characteristics of the heated plasma in the neutral jet. Researchers from the ground, by using low-light-level television cameras, will determine injection extent, velocity profile and percentage of ionization. Radar will measure ionospheric parameters prior to and during the experiments.

Dr. Roy Torbert, principal investigator from the University of Alabama, Huntsville, said, "We conducted a similar flight from Wallops in 1986. However, this launch will allow for a higher ambient plasma than occurred during the early morning flight in 1986."

Other researchers include Gerhard Haerendel and Arnoldo Valenzuela, Max Planck Institute for Extraterrestrial Physics, Munich, West Germany; Gene Wescott and Hans Nielson, University of Alaska-Fairbanks; Jason Providakes and Mike Kelley, Cornell University; John Foster, Massachusetts Institute of Technology; Kay Baker, Utah State University; Fritz Primdahl, Danish Space Research Institute; and C.G. Falthammar and V. Brenning, Royal Institute of Technology, Sweden. The NASA Wallops payload manager is Paul Buchanan and project engineer is Debra Frostrom.

This scientific mission is part of the overall NASA Sounding Rocket Program managed at Wallops. This program consists of approximately 40 sounding rockets launched each year from various worldwide locations.

- end -

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For Release:

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April 21, 1989

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RELEASE: 89-57

NASA SELECTS CONTRACTOR TO DEVELOP ADVANCED SOLID ROCKET MOTOR

NASA today announced selection of Lockheed Missile Systems Division, Sunnyvale, Calif., for final negotiations leading to the award of a contract to design, develop, test and evaluate a Space Shuttle advanced solid rocket motor (ASRM) and a contract for construction of facilities for production and testing of the ASRM hardware. The effort also will include an option for production of up to 44 motor sets. The new motor will replace, in the mid-1990s, the current Shuttle redesigned solid rocket motor.

Lockheed is teamed with Aerojet Space Booster Co., Sacramento, Calif., as its principal subcontractor on the ASRM program, and Rust International, Birmingham, Ala., as its facility contractor.

The total cost for the approximately 7-year development project and facility work is estimated by Lockheed to be in excess of $1.1 billion dollars. The precise values of both contracts will be determined in negotiations between NASA and Lockheed.

The ASRM program goal is to enhance Shuttle system reliability, safety and performance. It will improve system safety and reliability through quality and reproducibility enhancements, which in turn will result from optimum application of state-of-the-art automation and process control technology.

The ASRM also is intended to provide the Shuttle with the capability to lift heavier payloads into orbit, with the design goal being an increase of at least 12,000 pounds over the current payload delivery performance.

- more -

The major new facilities to be built for the ASRM project will be those required for production of motor segments, nozzles and associated hardware, at a rate of up to 30 motors per year. The facilities are planned for construction at the Yellow Creek site in extreme northeastern Mississippi, near the city of Iuka. The property is presently in the custody and control of the Tennessee Valley Authority, pending transfer of ownership to NASA.

Additional specialized facilities will be constructed at the John C. Stennis Space Center near Bay St. Louis, Miss., for ground testing of the ASRM. The Stennis Center has long been NASA's primary testing center for liquid fueled rocket engines and now will have the unique test stands and apparatus required for static firing of powerful solid rocket motors. It also is planned that a part of the effort will be done utilizing NASA's existing facilities at the Michoud Assembly Facility near New Orleans.

As part of the ASRM procurement, NASA officials requested and considered private-financing options for construction of the ASRM facilities, in addition to "up-front" government funding of the construction. NASA will negotiate with Lockheed on the basis of privately-financed construction. A bill providing for the Government's assumption of termination liability to contract on this basis is pending Congressional authorization.

In addition to the design, development, test and evaluation work, the primary ASRM contract will require Lockheed to produce the first 12 operational motors for use in a flight verification program consisting of six Shuttle missions. The projected schedule calls for delivery of the first flight set of motors in 1994. NASA plans to phase-in the ASRM hardware over approximately a 3-year period, after which use of the redesigned solid rocket motor will be discontinued.

As part of their proposals, ASRM offerors were each required to submit a production pricing proposal under which NASA, at its option, may order up to 88 motors beyond the initial 12. If the maximum quantity were ordered, it would consist of 40 operational flight sets (80 motors) and eight production verification motors for use in ground tests, and is estimated by Lockheed to be near $1 billion.

Lockheed was selected after an exhaustive review of the technical, management and cost proposals received in response to NASA's August 1988 request for proposals.

- more -

Major Lockheed subcontractors and their places of performance are: Aerojet Space Booster Co.; Aerojet Solid Propulsion Co., Sacramento; Babcock and Wilcox, Barberton, Ohio; Morton Thiokol Space Operations, Brigham City, Utah; Lockheed Austin Division, Austin, Texas; and Rust International.

The Marshall Space Flight Center, Huntsville, Ala., has management responsibility for the ASRM and will directly manage performance of the contract.

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

Jim Ball
Headquarters, Washington, D.C.
(Phone: 202/453-2927)

For Release:

April 21, 1989
Embargoed until
12:30 p.m. EDT

RELEASE: 89-58

NASA TO SUPPORT COMMERCIAL DEVELOPMENT SOUNDING ROCKET FLIGHTS

The National Aeronautics and Space Administration (NASA) announced today support for a series of commercial sounding rocket flights that will provide opportunities for the exploration of industrial space applications by NASA-sponsored Centers for Commercial Development of Space (CCDS).

Following the successful flight of Consort 1, a package of materials science investigations launched March 29 atop a commercially-provided rocket at White Sands Missile Range, N.M., NASA's Office of Commercial Programs has decided to extend funding support for a series of similar flights.

NASA will provide funds to help support the costs of payload development and launch services for two additional sounding rocket flights in FY 1990 and is planning to support from two to four flights annually thereafter depending on requirements.

The Consort 1 mission was conceived and managed by the Consortium for Materials Development in Space at the University of Alabama-Huntsville (UAH). The mission represented a pilot project in which $1.4 million in NASA grant monies, provided to the UAH Center for Commercial Development, financed the purchase of commercial launch services and payload integration.

"This experiment in private sector space operations worked marvelously," said James T. Rose, NASA assistant administrator for commercial programs. "The launch was a first for the U.S. commercial space transportation industry, proving that a private provider can efficiently serve the requirements of a commercial user with a minimum of government involvement."

Follow-on, sounding rocket flights will be procured and managed by the UAH CCDS, who also will integrate and prepare for flight the payload investigations conceived and developed by participating CCDS and their industry partners.

-more-

NASA's Office of Commercial Programs, Washington, D.C., created in 1984 to provide a focus for efforts to encourage greater private sector involvement and investment in the nation's civil space program, is responsible for the establishment and management of the 16 CCDS.

-end-

This release and other NASA information is available electronically through DIALCOM, INC. For access to NASA NEWS, through this system, contact the NASA NEWS representative, DIALCOM, INC. at 202/488-0550.

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

Sarah Keegan
Headquarters, Washington, D.C.
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For Release:
April 21, 1989

RELEASE: 89-59

NASA TO FLY ONE SHUTTLE MISSION BETWEEN MAGELLAN AND GALILEO

NASA today announced that STS-28, but not STS-33, will be flown between the upcoming Magellan mission (STS-30), scheduled for April 28, and Galileo (STS-34), currently targeted for Oct. 12, 1989.

This change to the flight schedule has been made to protect the opportunity to launch the Galileo mission early in its launch window and to return the orbiter Columbia to flight status as soon as possible.

STS-28 will be flown around the beginning of August. STS-33, which originally had been planned for August, will be flown after Galileo (STS-34). Launch dates for both missions will be set at their respective flight readiness reviews.

In making the announcement, Adm. Richard H. Truly, NASA associate administrator for Space Flight and nominee for NASA Administrator, said: "NASA management has become increasingly concerned that the work involved in preparing the orbiter Columbia for its first flight in over 3 years is taking long enough that it might endanger the option to launch Galileo at the opening of its launch window. Our overriding objectives in this situation are to protect the Galileo window and to fly Columbia as early as we can. We currently are assessing manifest options downstream of Galileo."

\- end -

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Jeff Vincent
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April 24, 1989

RELEASE: 89-60

ASSOCIATE DEPUTY ADMINISTRATOR HINNERS TO RESIGN

Dr. Noel W. Hinners, third ranking official of NASA and the principal senior assistant to the administrator and deputy administrator, today announced his resignation from the agency, effective May 14, 1989.

"I regret leaving before the transition to the new NASA administration is complete," Hinners said, "but uncertainty in interpretation of new post-employment laws led me to move the date forward. I am heartened, however, by knowing that the incoming administrator and his deputy will provide excellent leadership and advocacy of NASA and its institution."

Hinners also serves as the NASA chief scientist and oversees the institutional management of the agency. As NASA chief scientist, he is the principal adviser to senior management on agency-wide aspects of NASA's scientific activities.

Before his appointment to senior headquarters management in June 1987, Hinners served 5 years as director of the Goddard Space Flight Center, Greenbelt, Md. From 1979 to 1982, he was director of the Smithsonian Institution's National Air and Space Museum, Washington, D.C., and from 1974 to 1979 he served as NASA associate administrator for space science. Hinners joined NASA in 1972 as deputy director of lunar programs, Office of Space Science, NASA Headquarters.

Hinners began his career in space exploration in 1963 with Bellcomm, Inc., working on the Apollo program with emphasis on the selection of lunar landing sites and design of scientific tasks for the astronauts.

- more -

He received NASA Distinguished Service Medals for his leadership of the space science program and for contributions to the Viking and Voyager programs. He also has been awarded the Presidential Rank of Meritorious and Distinguished Executive.

Hinners was educated at Rutgers University, California Institute of Technology and Princeton University, where he received his doctorate in geochemistry and geology in 1963. He is a member of Phi Beta Kappa and Sigma Xi, the American Geophysical Union, the American Association for the Advancement of Science and the American Institute of Aeronautics and Astronautics.

- end -

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

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April 24, 1989

RELEASE: 89-61

ODUM ANNOUNCES RETIREMENT FROM NASA

James B. Odom, associate administrator for the Space Station Freedom program, announced today he will retire from NASA on April 30. "After 33 years, I've decided to make a career change," Odom said. "I regret the timing of my decision, but the impact of some upcoming changes on government retirees made it such that I did not get to pick the most desirable or optimum time to retire." Tom Moser, deputy associate administrator for the Freedom program will serve as acting associate administrator until Odom's successor is named.

Odom was appointed associate administrator for the space station program in April 1988. He came to Washington, D.C., from the Marshall Space Flight Center (MSFC), Huntsville, Ala., where he had served in a number of key positions over the past 30 years. Among the positions he held at Marshall were director of the Science and Engineering Directorate, manager of the Space Telescope Project and manager of the External Tank Project.

He has received numerous awards in recognition for his contributions to the space program, including the NASA Exceptional Service Medal for work on the second stage of the Apollo Saturn rocket and the NASA Distinguished Service Medal for work on the Space Shuttle program. Odom was twice awarded the Presidential Rank of Meritorious and Distinguished Executive for his efforts on the External Tank program and was most recently recognized by the National Space Club with the Astronautics Engineer Award for his engineering and management leadership.

Odom began his engineering career with the Chemstrand Corp., Decatur, Ala. In 1956 he joined the U.S. Army's rocket research and development team as a systems engineer at Alabama's Redstone Arsenal, and transferred to the MSFC in 1959 prior to its formal establishment in July 1960.

-more-

Odom was educated in Alabama at Troy State College and Auburn University where he earned a bachelor of science degree in mechanical engineering. He and his wife June will return to Alabama upon his retirement.

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

Sarah Keegan
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

April 24, 1989

Jeffrey Carr
Johnson Space Center, Houston, Texas
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RELEASE: 89-62

MCBRIDE TO LEAVE NASA; BRAND NAMED COMMANDER OF STS-35

Astronaut Jon A. McBride (Captain, USN) has announced his intention to leave NASA effective May 12, 1989.

McBride was named last year to command the STS-35 (ASTRO-1) mission, scheduled for launch in March 1990. He will be succeeded as STS-35 commander by Vance D. Brand.

McBride was selected as an astronaut in August 1978. He was the lead T-38 chase pilot for STS-1, the maiden voyage of Columbia in April 1981, and a Capsule Communicator (CAPCOM) in the Mission Control Center for Shuttle flights STS-5, STS-6, and STS-7.

He flew in space as pilot aboard Challenger on STS 41-G in October 1984. McBride was scheduled to fly next in March 1986 as the commander of STS 61-E. The flight was one of several deferred by NASA in the wake of the Challenger accident in January 1986.

McBride recently completed an assignment at NASA Headquarters, Washington, D.C., as the Acting Assistant Administrator for Congressional Relations, a post he held since September 1987.

He has also announced his intent to retire from the Navy in the near future. McBride said, "I've spent an extremely rewarding 25 years with NASA and the Navy. This move has been a very difficult decision for me. But in the final analysis, I felt it was time to make a career change and return to West Virginia. I'll continue to follow developments in the space program with keen interest".

-more-

Brand joined NASA as an astronaut in 1966. He flew as Apollo command module pilot on the Apollo-Soyuz Test Project mission in 1975. Brand has also flown as commander of Shuttle missions STS-5 in November 1982 and STS 41-B in February 1984. Brand currently serves as JSC's Assistant Manager for Space Station Integration and Assembly. He was born on May 9, 1931 in Longmont, CO.

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

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Headquarters, Washington, D.C.
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April 26, 1989

RELEASE: 89-63

U.S. LAUNCHES MOST AMBITIOUS SPACE SCIENCE PERIOD

America's planetary exploration program, which almost became an "also ran," will reassume world leadership with the launch of the Magellan spacecraft to Venus, the head of NASA's space science program said today.

Dr. Lennard A. Fisk said the Magellan launch on Friday will mark the beginning of a "new golden age of space science" with 36 major missions in the next 5 years. "If we are smart, we will use these missions to conduct the biggest and the most public science and engineering lesson ever for the youth of this nation."

"There is no task more important for a government than to instill in its people the conviction that the future will be brighter than the present," Fisk said. While conceding that there are national defense and poverty problems in this country, Fisk stated that funds have been committed for these activities and that "somewhere among these expenditures that are based on fear and on injustice, there also should be expenditures based on hope for a brighter tomorrow."

Fisk said that the United States is again the leader in planetary exploration and "we are determined that never again will this leadership be allowed to pass from us."

Two days from now, the Shuttle Atlantis will lift off from Kennedy Space Center, carrying the Magellan space probe destined for Venus. "The Magellan mission alone will return more data than all previous planetary mission combined."

Fisk made these and other points:

o Magellan will map the surface of Venus with a radar that has 10 times the resolution of any previous U.S. or Soviet mission.

- more -

Magellan will cover 90 percent of the planet as opposed to only 25 percent by the last Soviet mission and should answer the fundamental question of why Venus -- which is so similar to the Earth in size and location -- is so different.

o NASA will complete the Hubble Space Telescope, the Gamma Ray Observatory, the Advanced X-Ray Astrophysics Facility and the Space Infrared Astrophysics Facility. These four great observatories, spanning the electromagnetic spectrum from infrared to gamma rays, possess resolution and sensitivity never before possible in astronomy.

o The Cosmic Backround Explorer this summer will probe the backround radiation left over from the birth of the universe -- the big bang.

o The Astro Spacelab mission, next year, will make definitive measurements of the recent supernova -- the closest observable supernova in 400 years.

o Ulysses will examine the poles of the sun, the Upper Atmospheric Research Satellite will study the Earth's atmosphere, Mars Observer exploration will follow in 1992 and Galileo will explore Jupiter and its moons in 1996.

o The Earth Observing System (EOS) will study our planet from the polar platforms of Space Station Freedom, making continuous and comprehensive measurements of the Earth and what humans are doing to it. EOS "will serve as a basis for sound policy decisions to protect the future of our planet...a graphic demonstration of American technology in space serving the peoples of the world."

"We need to appreciate," Fisk said, "that with all these activities and plans, we are sending a simple but very powerful message -- that we are a nation that believes in its future."

- end -

The text of Fisk's speech can be obtained from the NASA Headquarters Newsroom (202/453-8400).

NASA

National Aeronautics and
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Washington, D.C. 20546
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For Release:

May 1, 1989

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Linda S. Ellis
Lewis Research Center, Cleveland
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RELEASE: 89-64

NASA FINAL PROPFAN PROGRAM FLIGHT TESTS CONDUCTED

A one-of-a-kind aircraft has been gathering attention in Cleveland skies for the past few months. The airplane is the propfan test assessment (PTA) aircraft, a modified Gulfstream II equipped with an eight-bladed, single-rotation, advanced turboprop (propfan) on its left wing.

Tests show that advanced turboprop propulsion systems can reduce fuel usage by 25 to 30 percent compared to future turbofan engines with equivalent levels of advanced technology. To reap the benefits of this major advance in aero-propulsion technology, the U.S. aviation industry is currently considering the development of several new engines and aircraft that may incorporate advanced turboprop propulsion systems.

In May 1988, the prestigious Robert J. Collier Trophy was presented to Lewis and the NASA/Industry Advanced Turboprop Team for developing the technology and testing advanced turboprop propulsion systems that offer dramatic reductions in fuel usage and operating costs for subsonic transport aircraft. The Collier Trophy is awarded annually by the National Aeronautic Association for the greatest achievement in aeronautics or astronautics in America.

The initial concepts for the award-winning advanced turboprop propulsion systems originated at Lewis in the mid-1970's in response to rapidly increasing fuel prices resulting from the initial OPEC oil embargo.

Early cooperative research by NASA Lewis and Hamilton-Standard, Windsor Locks, Conn., resulted in advanced propeller designs featuring thin, highly swept and twisted blades.

- more -

In the early 1980's, Lewis also worked with GE Aircraft Engines on the unducted fan, a concept of a gearless, counter-rotating propeller engine. The feasibility of achieving major improvements in aerodynamic efficiency with these unique propellers operating at high speeds (Mach 0.8) was subsequently demonstrated in wind tunnel tests at NASA and industry facilities.

This led to a major NASA/industry/university program to develop the aerodynamic, structural, mechanical and acoustical technologies required to verify performance of these systems in ground and flight tests.

The advanced turboprop is the focus of the NASA advanced turboprop project which, since 1975, has developed advanced technology that can reduce fuel consumption of future aircraft and help the U.S. domestic aircraft industry maintain its position of world leadership.

The NASA flight test, consisting of three phases and totaling about 100 hours, began in February to collect data that will help verify predicted loads as well as propfan acoustics.

The first phase of the PTA tests was staged in Cleveland from NASA Lewis Research Center. Researchers flew the PTA aircraft in formation with a microphone-instrumented Lear 25 aircraft to map the propeller source noise in the vicinity of the PTA vehicle. This test phase added to the noise source mapping conducted earlier in the original PTA program. The second phase was conducted in April in conjunction with NASA's Langley Research Center, Hampton, Va., and the Federal Aviation Administration.

The flights were conducted from NASA facilities at El Paso, Texas, and overflew a segment of the White Sands Missile Range in N.M., where ground measurements of propfan enroute noise were made. The PTA aircraft flew at altitudes ranging from about 2,000 feet to 35,000 feet during the 3-week test period.

These flights provided ground-based researchers with their first opportunity to collect PTA enroute noise data generated during low altitude overflights. Previous data collection investigated ground noise generated only by altitude overflights.

The third and final phase of flights will be conducted from Lewis Research Center during May and June. Instantaneous pressure measurements on propfan blade surfaces will be taken at several flight speeds with a range of power settings on the eight-bladed propfan.

- more -

After completion of these tests, the aircraft will be delivered to the Johnson Space Center, Houston. There the advanced turboprop system will be removed and the aircraft will undergo a second major modification, this time to a Shuttle Training Aircraft.

Managed by the Lewis Research Center's Advanced Turboprop Project Office, the program also incorporated technical expertise from the other two NASA aeronautics research centers: Langley Research Center, Hampton, Va.; and Ames Research Center, Mountain View, Calif., which includes Dryden Flight Research Facility, Edwards, Calif. More than 40 industrial contracts and 15 university grants supported the program, as well.

A major milestone was reached in 1987 when three series of flight tests verified the readiness of advanced turboprop propulsion technology for commercial engine systems development.

The flight testing included the NASA/GE/Boeing flight tests of the unducted fan engine (UDF) on a B-727 aircraft; the NASA/Lockheed Propfan Test Assessment of a single-rotation advanced turboprop on a Gulfstream II aircraft; and GE/McDonnell Douglas flight tests of the UDF on an MD-80 aircraft.

A joint venture of Pratt & Whitney and Allison conducted extensive ground tests of a geared, counter-rotating propfan propulsion system in 1987 and in early 1989, successfully flight tested the engine on a McDonnell Douglas MD-80.

- end -

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Dwayne C. Brown
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

May 1, 1989

RELEASE: 89-65

EIGHT FIRMS NAMED NASA QUALITY AND PRODUCTIVITY FINALISTS

Eight finalists have been selected for the NASA Excellence Award for Quality and Productivity for 1988/89, the National Aeronautics and Space Administration announced today. The finalists are:

* Barrios Technology
  Houston

* Bendix Field Engineering Corp.
  Columbia, Md.

* Boeing Computer Support Service
  (Computational Mission Services)
  Huntsville, Ala.

* Computer Sciences Corp.
  Houston

* EG&G Florida, Inc.
  Kennedy Space Center, Fla.

* Grumman Technical Services Division
  Titusville, Fla.

* Lockheed Engineering & Sciences Co.
  Houston

* Rockwell International Corp.
  Space Transportation Systems Division
  Downey, Calif.

NASA Associate Administrator for Safety, Reliability, Maintainability and Quality Assurance George A. Rodney announced the finalists after a 6-month process following release of award application guidelines. Finalists were chosen after a review by the award evaluation committee.

-more-

The award is administered for NASA by the American Society for Quality Control, Milwaukee, Wisc., a professional association and a worldwide leader in development, promotion and application of quality and quality-related technologies. The award recognizes NASA prime contractors, subcontractors and suppliers for outstanding achievement in quality and productivity improvement.

The award process now advances to the third phase - validation team visits to finalists' facilities to verify performance achievements and process attainments.

Following this review and recommendations of the award evaluation committee, NASA's Quality and Productivity Steering Committee, composed of center directors and Headquarters associate administrators, will make the final selection of award recipients. The NASA administrator will announce award recipients at the sixth annual NASA/contractor conference on Oct. 31, 1989.

Key goals of the award are to institutionalize quality and productivity practices throughout NASA and the agency's contractors and to transfer performance improvement methods of the award recipients to others.

The recipient for 1987/88 was Rockwell International's Rocketdyne Div., Canoga Park, Calif. Rocketdyne is primarily responsible for design, development and production of the Space Shuttle main engines.

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

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May 1, 1989

RELEASE: 89-66

VIRGINIA TECH STUDENTS BUILD MOCKUP OF NATIONAL AERO-SPACE PLANE

A mockup of the National Aero-Space Plane (NASP) will be rolled out May 5 at a ceremony at Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Va.

A group of engineering students at Virginia Tech has spent the last 5 months designing and building the mockup for the jointly funded NASA/Department of Defense NASP program. The mockup will be displayed at the U.S. pavilion at the Paris Air Show in June and is slated for exhibition at the Dayton Air and Trade Show later this summer.

Working under an existing NASA grant with funds provided by the NASP Joint Program Office, the mechanical and aerospace engineering students have designed and built the 80-foot-long mockup based on a generic government concept for the vehicle. The mockup had a $73,000 budget.

The mockup will be turned over to the Joint Program Office at a special rollout ceremony at Virginia Tech on May 5. Dr. William Graham, science advisor to the President and director of the Office of Science and Technology Policy, will speak at the ceremony, which will be attended by the participating students, their parents, project faculty and NASP program managers. The mockup will be accepted by Dr. Robert R. Barthelemy, director, NASP Joint Program Office. Dr. Paul E. Torgersen, dean of Virginia Tech's College of Engineering, will preside at the ceremony.

Virginia Tech was selected for the project because a number of engineering faculty members already were involved with design aspects of NASP and the students were able to work under an existing grant. The students have worked under the guidance of Mechanical Engineering Professor Walter O'Brien and Associate Dean of Engineering Jim Marchman. The project was coordinated for the NASP Joint Program Office by Dick Culpepper, director of technology transfer.

- more -

The students began the project in December 1988. An ambitious undertaking for the 5 months allocated to the project, the students have worked in teams, devoting many evening and weekend hours to assure completion. The students used computer-aided design facilities at Virginia Tech to assist with the mockup's design. A structures team took the project from design to frame by cutting and hand-fitting pieces of aluminum. The frame then was fitted with expanded polystyrene foam. The final weatherproof finish was done in red, white and blue.

In addition to building the model, students had to address transportation logistics including design and construction of shipping containers. A number of the students will be traveling to Paris with the mockup to install and take down their project.

Several companies provided materials for the mockup. They include: Radva Corp., Radford, Va.; Reynolds Metals, Richmond, Va.; ICOTE International Corp., Bell Meade, N.J.; Goodyear Tire Co., Akron, Ohio; and Van Dusen Airport Services, Nashville, TN.

The NASP program is currently in the technology development phase. The program's goal is an X-30 research aircraft that would demonstrate the technologies needed to take off and land on conventional runways, reach hypersonic speeds up to Mach 25 through the atmosphere and achieve Earth orbit, using a liquid hydrogen-fueled air-breathing engine.

The technology developed in this program is expected to lead to follow-on operational vehicles that will complement existing launch vehicles, providing rapid and flexible access to space. The technology also will have revolutionary applications for the civil and commercial aviation sector for air and space transportation.

Budget proposals currently before Congress may lead to changes in the funding levels for and management of the NASP program. The President's National Space Council, chaired by Vice President Dan Quayle, soon will be undertaking a review of the NASP program.

The NASP team is comprised of approximately 5,000 members of the U.S. government, universities and industry. Industry partners in the project are General Dynamics Corp., Ft. Worth, Texas; McDonnell-Douglas Corp., St. Louis, Mo.; Rockwell International Corp., Los Angeles, Calif.; Pratt & Whitney, West Palm Beach, Fla.; and Rockwell's Rocketdyne Division, Canoga Park, Calif.

-end-

Note: Photographs and videotape to support this release are available from Virginia Tech. Contact Lynn Nystrom, College of Engineering, 703/231-6641.

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

May 3, 1989

RELEASE: 89-67

APOLLO 11 CREW 20TH ANNIVERSARY PRESS CONFERENCE SCHEDULED

In preparation for the upcoming 20th anniversary of the first manned lunar landing, the Apollo 11 astronauts will participate in a press conference in Wash., D.C., May 26, 1989.

The press conference with Neil Armstrong, Buzz Aldrin and Michael Collins will begin at 10:30 a.m. EDT in the NASA Headquarters 6th floor auditorium, 400 Maryland Avenue, S.W.

Due to the limited time available, it will not be possible to schedule individual media requests for interviews with the crew. However, an audio and video tape of interviews will be prepared by NASA where the most anticipated questions will be asked. These tapes will be available by June 9. A transcript of the press conference will be available by June 5.

This material will be available to bonafide news media representatives by calling or writing:

Audio Visual material:
Broadcast and Audio Visual Branch - LMD
NASA Headquarters, Wash., D.C. 20546
(Phone: 202/453-8594)

Transcript:
News and Information Branch - LM
NASA Headquarters, Wash., D.C. 20546
(Phone: 202/453-8400)

News media reps planning to attend this press conference must contact the Headquarters newsroom (202/453-8400) by May 22 to gain admittance to the conference.

The conference will be carried live (monitor only) on NASA Select television, Satcom F-2R, Transponder 13, at 72 degrees West Longitude, 3960.0 MHz, audio 6.8 MHz.

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Mark Hess
Headquarters, Washington, D.C.
(Phone: 202/453-4164)

May 5, 1989

RELEASE: 89-68

LOGO SELECTED FOR SPACE STATION FREEDOM PROGRAM

NASA's office responsible for the development of the permanently manned space station, called Freedom, today issued its official logo. The logo was designed by Justin Associates of Washington, D.C.

"With the adoption of the logo, the Freedom program has a symbol that will distinguish it from all others," said Tom Moser, acting associate administrator for the space station program, in announcing the new logo.

The logo depicts a stylized version of the Freedom program's manned base featuring two of its most dominant features -- the pressurized modules where space station crew members will work and live and the large solar panels. The circular shape in the background represents both the Earth and other planets.

Space Station Freedom will be an international space complex used for fundamental research in the materials and life sciences, and to explore the Earth and outer space. Ultimately, Freedom will be an orbital stepping stone for extending human presence beyond Earth orbit into the solar system. An important element of the logo is the name, Freedom, which was announced last year by former President Ronald Reagan.

- end -

A black and white photograph of the logo is available to media representatives to illustrate this release (phone: 202/453-8375). The photo number is 89-H-265

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

May 5, 1989

Nancy Lovato
Ames/Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE: 89-69

NASA FLIES FIRST AIRCRAFT SELF-DIAGNOSTICS SYSTEM

In the first flight in a joint NASA/USAF program that promises self-repairing flight controls and lower maintenance costs in future aircraft, computers aboard the NASA Ames-Dryden F-15 Flight Research Aircraft were able to correctly identify and isolate in flight a simulated failure in the flight control system.

Flight control system failures can and do occur during flight. When this happens, costly ground maintenance diagostic tests are conducted to try to identify the failure so that appropriate corrective actions may be taken. In many cases, the failure cannot be identified during ground tests because the actual flight conditions are not duplicated. With the new expert system technology, failures can be identified and isolated before landing and be fixed immediately.

The first simulated failure was an angle-of-attack sensor. The maintenance diagnostic system correctly identified the failure and isolated the problem. Future tests will incorporate other failures.

"This is a real breakthrough in flight control system maintenance diagnosis for future aircraft," says F-15 Flight Research Aircraft Project Manager Dr. James Stewart. "Newer digitally-controlled aircraft are more complex. However, digital controls allow this type of computer programming which will reduce the maintenance cost of future digitally-controlled aircraft."

-more-

The maintenance diagnostic system is the first technology to be tested in the Self-Repairing Flight Control Program. The other technologies, scheduled to begin flight tests this fall, include failure detection, identification and reconfiguration of the flight control system.

An example of the need for reconfiguration is when a tail surface fails in flight. The flight control system will be reconfigured (repair itself) so that other surfaces take over the function of the failed tail surface. Also, a pilot alert system will tell the pilot what the problem is and what the new configuration and flight envelope are after the system has self repaired.

This program is being conducted by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., and is sponsored by the Air Force Wright Research and Development Center, Wright-Patterson Air Force Base, Ohio. The prime contractor, McDonnell Aircraft Company, St. Louis, Mo., with the General Electric Aircraft Control System Division, Binghampton, N.Y., designed and developed the maintenance diagnostic system for use in the NASA program.

-end-

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Terri Sindelar
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

May 10, 1989
Embargoed until 3 p.m. EDT

RELEASE: 89-70

PRESIDENT BUSH NAMES REPLACEMENT ORBITER "ENDEAVOUR"

President Bush today chose the name "Endeavour" for the new Space Shuttle orbiter, currently under construction.

The name Endeavour resulted from a nationwide orbiter-naming competition supported by educational projects created by student teams in elementary and secondary schools.

In the nationwide competition, involving over 71,000 students, the national winner in Division I (kindergarten through grade 6) is the fifth graders from Senatobia Middle School, Senatobia, Miss. The team created a space camp simulation, where they taught lower elementary students facts about space through hands-on activities. The nine activities ranged from packaging payload experiments, wireless communication, working a manipulator arm to trying on a team-made spacesuit.

In the Division II category (grades 7 through 12), the winning team is from the Tallulah Falls School, Inc., Tallulah Falls, Ga. The nine-member team was composed of math students in grades 8-12. The team project was two-fold. They developed a math magazine, "Math Exploration with James Cook," written on 3 education levels, and they created a play, "Where On Earth?...," comparing Cook's 18th-century sea exploration to the Space Shuttle "Endeavour's" 20th-century space exploration.

These two national winning teams were selected from over 6,100 entries. The judging criteria was: 80 percent for the quality and creativity of the educational project to support and justify the name; 20 percent for the name's pronounceability for transmission and the ability to capture the spirit of the American pioneer spirit. The name had to be that of a seafaring vessel used in research or exploration. Both winning teams proposed the name "Endeavour."

- more -

Endeavour was the first ship commanded by James Cook, a British explorer, navigator and astronomer. In August 1768, on Endeavour's maiden voyage, Cook observed and recorded the transit of the planet Venus. In the view of the students, Cook's navigations, explorations and discoveries eventually led man to the possibilities of space exploration.

"In selecting the name Endeavour, the students and the President have identified a name that symbolizes perfectly NASA's goals of space exploration and discovery," said Dale D. Myers, NASA's Acting Administrator. "The nation can rest assured that we will use this ship with the same commitment that Captain Cook used his in the pursuit of new knowledge to benefit all mankind."

The two winning teams will be recognized in a Rose Garden ceremony at the White House on May 16 together with the STS-30 crew of Space Shuttle Atlantis.

The Council of Chief State School Officers administered the year-long program for NASA.

House Joint Resolution 559, introduced March 10, 1986, by Congressman Tom Lewis (R-Florida), called for the name of the replacement orbiter to be selected from suggestions submitted by students.

The new orbiter, previously designated OV-105, is being built by Rockwell International, Downey, Calif., to replace the Space Shuttle orbiter lost in the Challenger accident. Endeavour is scheduled to be completed in 1991 with her maiden voyage scheduled for March 1992.

- end -

NOTE TO EDITORS: Fact Sheets about the two winning teams, the competition, the history of "Endeavour" and OV-105 are available from the NASA Headquarters Newsroom, Room 6043, 400 Maryland Ave., S.W., Washington, D.C., 202/453-8400.

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:
May 11, 1989

Edward Campion
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

NOTE TO EDITORS:

NASA TO SPONSOR HUMAN EXPLORATION OF THE SOLAR SYSTEM CONFERENCE MAY 31ST

"Pathway to the Planets," a two-day senior level conference on human exploration of the solar system will be held May 31 to June 1, 1989 at the Omni Shoreham Hotel, Washington, D.C.

Sponsored by NASA's Office of Exploration, the conference will cover options and opportunities for human exploration beyond low Earth orbit. Among others, these options include expeditions to Mars, human-tended Lunar science stations and evolutionary development of Lunar and Martian bases.

Particular emphasis will be on the challenges and opportunities for the U.S. industrial base. Key industries involved in human exploration include: aerospace, life sciences, electronics, robotics, mining, construction and resource exploration.

The conference will feature addresses by the director of the National Space Council, the NASA administrator, members of Congress and leaders from industry and academia. It will review all near-term NASA programs relating to human exploration and include a panel discussion to address "where we go from here."

- end -

NOTE: News media wishing to attend this event must obtain a conference press pass by calling 301/951-2107.

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

For Release:

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(Phone: 202/453-4164)

May 12, 1989

RELEASE: 89-72

MOSER TO LEAVE NASA MAY 13

Thomas L. Moser, acting associate administrator for the Space Station Freedom program, will leave NASA effective May 13. Moser, who was appointed deputy associate administrator for the Freedom program last December, has been serving as the acting associate administrator since April 30.

"My decision to leave is in no way a reflection on the status of the program," Moser said. "I am convinced that the Space Station Freedom program is absolutely necessary for this country to maintain its leadership in space and that NASA, along with the contractor team and international partners, will make it a success given the proper support. I'll sincerely miss NASA, but after 26 truly fulfilling years, I feel that it's the right time to go."

Moser served as the first program director of the Freedom program, a position he held from October 1986 to December 1988. He oversaw the establishment of the Space Station Freedom Program Office located in Reston, Va., and guided the program through extensive reviews by the Administration and the National Research Council and through the formation of the design, development and technical support contractor teams for Freedom.

Moser also helped put in place the structure for international cooperation in the Freedom program, which was formally adopted by the United States and the 11 participating countries last year.

From February 1986 until he was named to the space station post, Moser was deputy associate administrator for space flight at NASA Headquarters. Prior to that, he was director of engineering at Johnson Space Center, Houston.

- more -

Moser began his career with NASA in 1963 as a mechanical systems design and analysis engineer. From 1966 to 1971 he was the structural subsystem manager for the Apollo command module. In 1972, Moser was named head of structural design and manager for orbiter structure and thermal protection system.

He became technical assistant to the JSC director in 1981 and was named deputy manager, Orbiter Project Office, in 1982.

Born Aug. 12, 1938, in Houston, Moser received a B.S. degree in mechanical engineering from the University of Texas in 1961, an M.S. degree in mechanical engineering from the University of Pennsylvania in 1963 and completed candidacy requirements for a Ph.D. at Rice University.

Moser has received numerous honors, including the Presidential Rank of Meritorious Executive, the Exceptional Leadership Medal and Exceptional Engineering Medal and is a Fellow of the American Institute for Aeronautics and Astronautics.

Moser and his wife, the former Nelwyn DeLaney, reside in Reston, Va. They have two children, Matthew and Meredith.

- end -

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

Sarah Keegan
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

May 12, 1989

RELEASE: 89-73

NASA ANNOUNCES UPCOMING SHUTTLE FLIGHT SEQUENCE

NASA today announced the order of planned Space Shuttle flights between the Galileo mission to Jupiter and the Astro Spacelab mission. No planning dates for the missions after Galileo have been determined yet, but a full manifest will be published in the next several weeks.

After the Galileo mission, currently manifested for Oct. 12, 1989, the sequence of flights will be: the DOD mission, previously delayed to "protect" the Galileo launch window; the Syncom IV deployment/LDEF retrieval mission; a DOD mission; the Hubble Space Telescope mission; and the Astro mission.

Three weeks ago NASA management decided to fly only one mission between Magellan and Galileo to be as certain as possible that the Shuttle program would be ready to launch Galileo early in its planetary window. The advantages of this approach were demonstrated by the recent launch of Magellan, which began its journey to Venus last week. The flight sequence set out today is the best possible solution given the tight constraints of all the payload communities involved.

- end -

To: L, PAO.LOOP, [L/GSFCMAIL] GSFC/USA
Subj: HQ N89-42/Apollo 11 TV

for immediate release.

David W. Garrett
Headquarters, Washington, D.C.
(Phone: 202/453-8400)

May 15, 1989

N89-42

MEDIA TELEVISION ADVISORY

In preparation for the 20th anniversary of the first manned lunar landing, the Apollo 11 astronauts will participate in a press conference in Wash., D.C., May 26, 1989. The conference will begin at 10:30 a.m. EDT in the NASA Headquarters 6th floor auditorium, 400 Maryland Avenue, S.W.

TV cameramen are advised that camera-to-talent distance will be 40 feet for this conference. It is suggested that cameramen be equipped with 14X or greater zoom lenses.

Media reps planning to attend this conference must contact the Headquarters newsroom by May 22 to gain admittance to the conference. The conference will be carried live (monitor only) on NASA Select television, Satcom F-2R, Transponder 13, at 72 degrees West Longitude, 3960.0 MHz, audio 6.8 MHz.

-end-

Command?
disconnected

NASA News

National Aeronautics and
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Washington, D.C. 20546
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For Release:

Sarah Keegan
Headquarters, Washington, D.C.
(Phone: 202/453-8536)

May 15, 1989

Nancy Lovato
Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE: 89-74

NASA TO TEST SPACE SHUTTLE LANDING GEAR

Extensive tests of Space Shuttle orbiter landing gear assemblies, from normal conditions up to and including failure modes, will be conducted by NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., using a CV-990 aircraft. Planning and modifications to the CV-990 begin this year, with flight tests scheduled for 1990.

Data from the tests will give engineers information on what to expect should an orbiter experience a flat tire or other anomalies on landing and will provide data to help in developing crew procedures for various landing conditions and situations.

"During most of reentry and landing, the Space Shuttle becomes an airplane," says Ames-Dryden Project Manager Robert S. Baron. "By testing on actual landing surfaces, we can provide real-world experience for accurate simulations so that the astronauts will know better what to expect in any situation."

The tests are part of a continuing effort by NASA's Johnson Space Center to upgrade and enhance Space Shuttle landing capabilities. Officials at Ames-Dryden also hope to use the CV-990 as a testbed for future landing systems tests.

In addition to assessing and documenting performance of main and nose landing gear assemblies and tire and wheel assemblies, tests will evaluate brake and nose gear steering performance.

During the program, tests will be conducted on lakebed and concrete runways at Edwards, on the concrete Kennedy Space Center runways and on lakebed runways at White Sands Space Harbor.

- more -

The CV-990 will retain its normal gear. The orbiter landing gear will be installed so that it can be lowered hydraulically when the aircraft first contacts the landing surface.

The test gear assembly will be mounted on the CV-990's fuselage between the main tires, and a hole will be cut in the fuselage to accommodate raising and lowering the gear. The underside of the fuselage will be armor-plated to protect the aircraft from any possible damage.

High-speed video and film cameras, in addition to other instrumentation, will record the tests for thorough analysis. Landing speeds of the CV-990 will duplicate those of the orbiter, approximately 225 miles per hour.

Ames-Dryden project pilot for the landing gear tests is C. Gordon Fullerton, a veteran of two Space Shuttle flights.

Other organizations involved in these tests are the NASA Langley Research Center's Landing Impact Dynamics Facility, Hampton, Va.; Wright-Patterson Air Force Base's Landing Gear Development Facility, Dayton, Ohio; the B.F. Goodrich Facility, Troy, Ohio; and Rockwell International's Space Transportation Systems Division, Downey, Calif.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
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For Release:

May 16, 1989

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Jeffrey Carr
Johnson Space Center, Houston
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N89-43

EDITORS NOTE: STS-30 CREW PRESS CONFERENCE RESCHEDULED

The post-flight press conference with the STS-30 astronauts, originally set for Thurs., May 18 at 10 a.m. EDT, has been rescheduled for 12:30 p.m. EDT the same day.

The press conference will be held at the Johnson Space Center, Houston, in Building 2, room 135, and will feature a film and slide presentation followed by a Q&A session with media at participating NASA facilities.

The event will be broadcast live on NASA Select television, Satcom F2R, transponder 13, 72 degrees W. longitude.

- end -

NASA News

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For Release

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May 16, 1989

RELEASE: 89-75

TRULY SELECTS KELLER AS ASSOCIATE DEPUTY ADMINISTRATOR

Acting NASA Administrator Richard H. Truly today named Samuel W. Keller to be associate deputy administrator, the third-ranking position at NASA. In doing so, Truly moved quickly to address what he called his "first and top priority," filling vacant leadership positions at NASA Headquarters and field centers.

Truly called Keller "one of NASA's best professionals. He has a depth of experience and is just the kind of leader and decision-maker that NASA needs."

Keller has served as deputy associate administrator for space science and applications since December 1977. He succeeds Dr. Noel W. Hinners, who recently resigned.

Truly made the announcement in a televised address to all NASA employees, his first official remarks as head of NASA. He became acting administrator yesterday, and his nomination as administrator is expected to be addressed for confirmation by the Senate in coming weeks. He noted that several top NASA officials recently have left the agency, many because of uncertainty over new post-employment laws and the failure of a proposed pay raise.

"I will be filling other top jobs as quickly as I can," he said. "I intend to do all that I can to ensure that NASA continues to maintain and attract a team dedicated to excellence."

Truly also addressed fiscal issues, saying that "a particularly difficult battle" is being waged over NASA's fiscal year 1990 budget request. "We are fighting potential cuts that could delay, trim down or even kill Space Station Freedom," he said. "I want to assure you that I plan to fight those cuts all the way."

- more -

"We can't afford to short-change Space Station Freedom or any other major program," Truly said. "To do so would be to deny our own future as a nation. And I don't believe that President Bush or the American people want that to happen."

"We have great challenges ahead for the remainder of this century and well into the next," Truly told the NASA-wide audience. "We've proven time and again that we can meet great challenges, and we will continue to move our country forward in space technology and aeronautics."

Before coming to NASA Headquarters in 1975, Keller served as director of administration and management at Goddard Space Flight Center, Greenbelt, Md. He also held other management positions at Goddard and previously worked at the Applied Physics Laboratory and the Naval Research Laboratory.

He received a bachelor's degree in engineering from the University of Maryland and a law degree from George Washington University. He was born in Grafton, W.Va., and is married to the former Carroll Williams. They have two children.

- end -

National Aeronautics and
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Washington, D.C. 20546
AC 202-453-8400

David W. Garrett
Headquarters, Washington, D.C.
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For Release:
May 17, 1989

RELEASE: 89-76

NASA TO FEATURE HUBBLE SPACE TELESCOPE AT PARIS AIR SHOW

The Hubble Space Telescope (HST) will highlight the NASA exhibit at the 38th Paris Air Show, June 9-18.

The NASA exhibit, housed in the United States National Pavilion, will focus on astronomy in general and the HST in particular. The HST, a cooperative project with the European Space Agency and scheduled for launch by the Space Shuttle in early 1990, will allow astronomers to observe stars, planets and other objects 10 times more clearly than Earth-bound observatories.

The centerpiece of the 7,000-sq.-ft. e5Qvit is a@v||1-scale model of the HST with one side cutaway to show, through pulsed lighting, the interior components of the spacecraft. Other NASA programs featured in the exhibit are Space Shuttle, Space Station Freedom, the Tracking and Data Relay Satellite System, new space suit designs, the National Aero-Space Plane and other aeronautical subjects. Also, to commemorate the 20th anniversay of the first moon landing, artifacts from the Apollo 11 lunar mission will be displayed.

Prominently displayed outdoors near the entrance to the pavilion will be a 75-foot model of the National Aero-Space Plane.

Several press events related to the exhibit are scheduled during the show. J}O^ has been designated Apollo 11 day when the first lunar landing astronauts - Neil Armstrong, Buzz Aldrin and Michael Collins - will participate in an afternoon press conference. On June 12, astronauts Loren Shriver and Steve Hawley, members of the Space Shuttle/HST deployment crew, will meet the press.

NASA has been a major participant at the Paris Air Show, Le Bourget, since the mid-1960s.

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National Aeronautics and
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For Release:

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Marshall Space Flight Center, Huntsville, Ala.
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May 18, 1989

RELEASE: 89-78

BRIDWELL TO MANAGE SHUTTLE PROJECTS OFFICE AT MARSHALL

G. Porter Bridwell, director of the Institutional and Program Support Directorate at the Marshall Space Flight Center, Huntsville, Ala., has been appointed manager of the Shuttle Projects Office at the Center. He succeeds William R. Marshall, who has retired.

As manager of the Shuttle Projects Office, Bridwell becomes responsible for the planning and direction of National Space Transportation System Space Shuttle project activities assigned to the Marshall Center, including Space Shuttle main engine, external tank, solid rocket booster, related systems and test activities and the Michoud Assembly Facility.

He will manage Marshall Center and industry performance in planning, design, engineering, integration, development, production, testing, delivery and operations of Shuttle elements to be furnished to the Marshall Center, assuring that cost, schedule and performance goals are met.

Bridwell was born in Linton, Ind., Oct. 4, 1935. He graduated from State High School, Terre Haute, Ind., in 1953. He earned a bachelor of science degree in aeronautical engineering in 1958 from Purdue University, West Lafayette, Ind., and began his career as an engineer with Rocketdyne in Canoga Park, Calif.

Bridwell joined the Marshall Center in 1962, and his early experience included assignments within the former Saturn Systems Office and Saturn V Program Office. He transferred to the Shuttle Projects Office in 1975 and served in key positions including chief, Project Engineering Office, and deputy manager, External Tank Project. In February 1983, he was appointed manager of the External Tank Project. In the spring of 1987, he served temporarily as acting director, National Space Technology Laboratories in Mississippi. He was appointed director of Institutional and Program Support in October 1988.

Bridwell and his wife, the former Saundra L. Martin of Terre Haute, Ind., reside in Huntsville. They have two children.

- end -

NASA News

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Jim Ball
Headquarters, Washington, D.C.
(Phone: 202/453-2927)

For Release:

May 24, 1989

RELEASE: 89-79

COMMERCIAL SPACE RESEARCH LEADS TO IMPROVED POWER SUPPLY DEVICE

The Center for Commercial Development of Space Power, Auburn University, Ala., and Maxwell Laboratories, San Diego, Calif., have collaborated to develop a stronger, more efficient power supply for lasers, x-rays, spacecraft and other users.

The advance, which will result in commercial uses of the technology on Earth, represents the first technology "spinoff" from NASA/industry-supported research at the agency's 16 Centers for Commercial Development of Space. Maxwell will produce and market the new product and share revenues with the Auburn center. The system also is expected to be used in future space-based power devices.

The commercial product resulting from the research is a rectangular device, about the size of a stereo receiver, that transforms and conditions large voltages to charge capacitors used in such devices as x-ray systems, lasers, radar and microwave communications equipment. The system is lighter and more compact, reliable and efficient than existing systems that do the same job, according to project engineers.

"The commercial application of this technology is a major breakthrough in system efficiency, compactness and reliability," said Ray Askew, director of the Auburn center. "These features are critical to industrial, medical and space applications."

Conceived for use in space power equipment, work on the system began last year. Researchers on the project soon recognized the potential for spinning off the technology for commercial application on Earth. By late fall, the team had developed several prototype designs. The design was finalized in February and Maxwell is now fabricating production models.

The Auburn center receives grants from NASA's Office of Commercial Programs and other funding and support from industrial partners.

- end -

Additional information contacts: Ray Askew, director, Center for Commercial Development of Space Power - 205/844-5902; and Andrew Wilson, vice president, Maxwell Laboratories - 619/587-8428.

NASA News

National Aeronautics and
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Donald G. James
Ames Research Center, Mountain View, Calif.
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For Release:
May 26, 1989

RELEASE: 89-80

NASA/DARPA LOW-COST PARALLEL-PROCESSING COMPUTER DEMONSTRATED

NASA-Ames Research Center, Mountain View, Calif., and the Defense Advanced Research Projects Agency (DARPA), Washington, D.C., announced today the successful demonstration of a low-cost parallel-processing computer with the potential of producing capabilities equivalent to today's most advanced supercomputers.

NASA Program Manager Betty Berkstresser said, "Today's demonstration of the power of parallel-processing computers, configured for specific applications, opens new horizons for the scientific and engineering community."

Col. L. "Doc" Dougherty, DARPA program manager, said, "This adds a low-cost, flexible, application-specific supercomputer to compete with more expensive general-purpose supercomputing machines in the world market. It is a good solution for engineering teams that need a dedicated computer for structures, aerodynamics or electromagnetic design."

General Microelectronics, Inc. (GMIC), San Diego, Calif., under a subcontract to Northrop Corp., Hawthorne, Calif., which provided a significant financial contribution, developed the system called Configurable Architecture Parallel Processing System (CAPPS). The CAPPS hardware measures just 18.3 cu. ft. The test code used for the demonstration was FLO57, a standard 10,206 grid-point code used in computational fluid dynamics. On the CAPP's hardware, it has a sustained speed of 14 million floating-point operations per second.

By matching hardware and systems software using the systems approach, GMIC demonstrated the potential for supercomputing performance. This demonstration opens the possibility of vastly improving the cost effectiveness of computers applicable for a host of aerospace applications.

- more -

With this technology, engineers can have supercomputer power on easily-afforded computers. Simulation could be the immediate beneficiary of this advance in computer technology. Other disciplines with potential applications from this fallout of NASA/DARPA research include: simulation of multiple aircraft, flight control computers, computational fluid dynamics, structural analysis, computational electro-mechanics, artificial intelligence, data acquisition and process monitoring.

Computers normally execute "serially" - marching through the code solving one line of a program at a time. Scientific programs modeling physical phenomena, e.g., simulations, have to calculate many simultaneous events sequentially. Parallel processing employs more than one processor. It is like having several mathematicians work a large problem instead of just one.

At stages in the problem, each processor will be waiting for answers from another, but interim solutions can be derived concurrently. With complex computer codes, the trick is to know which routines depend on each other to avoid data transfer delays and to efficiently use all processors.

Under the current DARPA-sponsored contract, Northrop will take immediate delivery of the eight-node CAPPS from its subcontractor GMIC and delivery of a 24-node system from GMIC within 60 days. A "node" refers to a processor or the equivalent of one computer.

The aerospace industry, NASA and the rest of the scientific community require solutions to problems so large and so computer-intensive as to be unaffordable using the largest supercomputers available today and those projected for the near future. Thus new directions need to be taken.

General Microelectronics recently formed Supercomputing Solutions, Inc., with Concurrent Computer Corp. to develop a complete product line of computational "engines" using parallel architecture supercomputer hardware and software for the solution of many scientific and engineering problems.

The research program was DARPA funded and Ames managed.

- end-

A photograph to illustrate this release is available to media representatives by calling 202/453-8375.

Color: 89-HC-344 B/W: 89-H-324

NASA News
National Aeronautics and
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Washington, D.C. 20546
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For Release

Jim Ball
Headquarters, Washington, D.C.
(Phone: 202/453-2927)

May 30, 1989

RELEASE: 89-81

NASA COMMERCIAL PROGRAMS OFFICE TO EXHIBIT AT PARIS AIR SHOW

An exhibit featuring the cooperative efforts of NASA and U.S. industry to commercially develop space will be displayed in the United States National Pavilion at the 38th Paris Air Show, June 9-18.

The exhibit highlights the development of commercial applications, and focuses on current research activities underway by NASA and U.S. companies through programs such as Joint Endeavor Agreements and the Centers for the Commercial Development of Space.

Also displayed with the exhibit will be scale models of commerical space hardware provided by U.S. commercial space transportation firms, satellite manufacturers, and privately-developed orbital laboratory facilities.

The commercial programs exhibit will be located with U.S. industry displays and staffed by representatives of NASA's Office of Commercial Programs.

The Office of Commercial Programs was created in 1984 to provide a focus for efforts to encourage greater private sector involvement and investment in the nation's civil space program.

- end -

NASA News

National Aeronautics and Space Administration

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For Release

Mary Sandy
Headquarters, Washington, D.C.
(Phone: 202/453-2754)

May 30, 1989

Nancy Lovato
Dryden Flight Research Facility, Edwards, Calif.
(Phone: 805/258-8381)

RELEASE : 89-82

NASA CELEBRATES FLIGHT OF FIRST HYPERSONIC RESEARCH AIRCRAFT

Thirty years ago on June 8, 1959, NASA's famed rocket-powered X-15 knifed through the clear desert sky over California to become the world's first hypersonic research aircraft, eventually flying at over six times the speed of sound.

North American Aviation pilot A. Scott Crossfield was at the controls for the first flight. X-15s flew until Oct. 24, 1968, when NASA's William H. Dana, now chief test pilot at Ames-Dryden, made the last flight of the program.

The three X-15 research aircraft flew a total of 199 flights in what is widely regarded as one of the most successful aeronautical research programs ever conducted. The X-15 flew to altitudes in excess of 67 miles, making it the first "spaceplane."

The X-15 was developed to provide research data on aerothermodynamics, aerodynamics, structures, flight controls and the physiological aspects of high-speed, high-altitude flight. While the original design goal was 4,000 miles per hour, 4,520 miles per hour was achieved. The highest altitude flown -- 354,200 feet -- far exceeded the original goal of 250,000 feet.

Since the X-15 flew to the edge of space, researchers were able to fly many experiments on a repeated basis that aided in developing space technology. The capabilities and limitations of the human pilot in flying space trajectories and reentry maneuvers were thoroughly explored.

- more -

Over 700 technical documents were created through the course of the program, greatly increasing information available to the then-blossoming space industry. Based on the success of the X-15 design, development and flight program, the Mercury, Gemini and Apollo spaceflight programs were accelerated.

"The result of the focusing and stimulating effects of the program was to generate aerospace vehicle technology at a highly accelerated rate compared to the more leisurely rate that existed prior to the X-15," said X-15 program official John V. Becker of NASA's Langley Research Center, Hampton, Va. "Thus when it became clear that the Space Age was upon us and the need to put a human into Earth orbit became a matter of national urgency, a massive backlog of aerospace technology was already at hand in the X-15 program."

Twelve military and civilian test pilots flew the aircraft during the joint NASA-USAF-Navy program. Of the twelve, Neil A. Armstrong went on to become the first man to set foot on the moon, and Joe H. Engle flew the Space Shuttle. Three pilots are deceased.

Officials at NASA's Ames-Dryden Flight Research Facility, Edwards, Calif., are planning a technical symposium on June 8 to mark the anniversary, which includes a panel of former X-15 pilots.

Eight former X-15 pilots presently are confirmed to participate in the pilots panel that will discuss various aspects of the flight program. These include A. Scott Crossfield, presently a technical consultant to the Science, Space and Technology Committee, U.S. House of Representatives; Joe H. Engle, USAF retired; Robert M. White, USAF retired; Forrest S. Petersen, USN retired; Robert A. Rushworth, USAF retired; Milton O. Thompson, currently chief engineer at Ames-Dryden; William J. Knight, USAF retired and currently mayor of Palmdale, Calif.; and Dana. They will be joined by X-15-era Dryden director Paul Bikle, now retired.

- end -

Note to Editors: Media wishing to cover either the X-15 pilot's panel or technical symposium should contact Nancy Lovato, NASA Ames-Dryden Public Affairs at (805) 258-3449. An X-15 video clip and photograph are available from NASA Headquarters, (202) 453-8375.

Photograph:	B&W	Color
	89-H-325	89-HC-345

NASA News

National Aeronautics and
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Washington, D.C. 20546
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For Release: June 1, 1989

RELEASE: 89-83

U.S./U.S.S.R. SPACEBRIDGE HELPING ARMENIAN EARTHQUAKE VICTIMS

U.S. and Soviet physicians are at the halfway point in a 2-month-long telemedicine spacebridge set up to provide medical assistance to the victims of the earthquake that devastated parts of the Soviet republic of Armenia in December 1988. NASA initiated the idea immediately after the earthquake to help Armenian physicians with diagnosis and treatment.

Since May 1, dozens of physicians have been meeting from 9 a.m. to 1 p.m. EDT (6 p.m. to 10 p.m. Armenian time), Monday through Friday, to discuss difficult medical cases resulting from the earthquake. Each case presented was representative of many people suffering the same medical problems. Daily spacebridge sessions will continue through June 30.

Many of the cases discussed are injuries requiring reconstructive or plastic surgery, orthopedics or prosthetics. Post-traumatic stresses also account for cases requiring psychiatric or psychological treatment. Many consultations focus on public health issues such as sanitation problems and epidemiological concerns. Cases addressed are earthquake victims, although other problem cases have been discussed.

Linked by satellite, the doctors have access to audio, visual and facsimile communications capabilities at NASA Headquarters, Washington, D.C.; the Republic Diagnostic Center, Yerevan, Armenia (outside the disaster zone); the Uniformed Services University of Health Sciences, Bethesda, Md.; the University of Maryland Institute of Emergency Medical Services System, Baltimore; the University of Texas Health Science Center, Houston; and the University of Utah and LDS Hospital, Salt Lake City.

- more -

Armenian doctors prepare their cases according to an agenda that sets the subject for each day's consultation, sending facsimile data on the cases to U.S. participants before each session begins. During the consultation, the Armenian doctors present their cases one by one, sometimes with the patient on hand, displaying x-rays, CT scans and other relevant data. Doctors at the U.S. medical centers then make recommendations for treatment or further study.

This telemedicine consultation spacebridge also is used by the medical team members of the International Red Cross, also treating the earthquake victims, to consult with their colleagues in U.S. hospitals.

The spacebridge has turned out to be a very successful endeavor say NASA Life Sciences Division doctors who are participating. In addition, spacebridge participants now know how to conduct a complicated telemedicine consultation, and this knowledge will come in handy in case of future emergencies. Another benefit is that U.S. and Armenian physicians have formed fast friendships. Spacebridge also is providing an invaluable experience in space medicine in planning for medical support for future human missions both in low-Earth orbit and planetary exploration.

NASA presented the Soviet government with an official offer of telecommunications assistance on Dec. 22, 1988, not long after the earthquake occurred. The Soviet Union accepted the offer in late February. NASA and Soviet physicians and communications specialists met in Moscow and Yerevan in March and signed an agreement to establish a spacebridge. In April, Armenian medical specialists visited U.S. medical facilities and finalized a spacebridge implementation plan.

NASA's Goddard Space Flight Center, Greenbelt, Md., is providing a small project management center to ensure proper functioning of the communications link. AT&T, Intelsat and Comsat are donating on-orbit communications service. Bendix is providing communications support and STARS of Houston has provided a transportable ground station for the Yerevan center.

- end -

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202-453-8400

For Release:

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Headquarters, Washington, D.C.
(Phone: 202/453-8536)

May 31, 1989

Ernie J. Shannon
Marshall Space Flight Center, Huntsville, Ala.
(Phone: 205/544-0034)

C89-I: OPTION EXERCISED ON BOEING SERVICES CONTRACT

NASA has elected to exercise a second 1-year option on the computational mission services contract with Boeing Computer Support Services, Inc., Seattle, beginning June 1 and running through May 31, 1990, for the Huntsville Computer Complex, a facility of the Marshall Space Flight Center, Huntsville, Ala.

Under the contract which began in June 1987, Boeing provides resources management; computer operations and systems software; equipment maintenance; applications software development; computer systems engineering; realtime and post-launch data processing and data reduction and software; and procurement of equipment, supplies, parts and services.

The initial 1-year performance period ended in May 1988. At that time, the first 1-year option was exercised. This second 1-year option is valued at more than $29,278,000.

The cost-plus-award-fee contract calls for a total of nine 1-year options. The present dollar value of the contract, including this option, is $101,026,000.

- end -

NASA News

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June 2, 1989

RELEASE: 89-84

NASA SELECTS UNIVERSITIES FOR ADVANCED ENGINEERING DESIGN GRANTS

NASA announced today the selection of 36 universities as recipients of 3-year grants to design advanced aeronautics and space mission concepts as topics for senior engineering design courses.

The University Advanced Design Program grant recipients will study topics in space and aeronautics missions, in the post-Space Station era, such as manned Mars aircraft and delivery system, long-term space habitat, lunar launch and landing facilities and operations and trans-Pacific, high-speed civil transport.

NASA's University Advanced Design Program, managed by the Universities Space Research Association (USRA), Houston, is a unique national program that brings together NASA engineers and U.S. engineering school students and faculty by integrating current and future NASA space and aeronautics design projects into the university engineering curriculum. The program, in its fifth year, continues to provide a sophisticated level of engineering opportunities not normally available to undergraduate students. To date, over 1,000 students from 39 universities have participated in the program.

The program supports NASA's goal to broaden the nation's engineering capability to meet the critical needs of the civilian aerospace program. In addition, John Alred, advanced design program manager, Division of Educational Program, USRA, said "NASA gets some very good studies and fresh viewpoints. The university departments get engineering design projects worthy of their best talent and renewed prestige within the university community. Students win most of all -- a real challenge that motivates their very best effort and a systems-design approach for the years ahead."

After a competitive review of proposals, 28 universities in the field of advanced space design and 10 universities in advanced aeronautics design were selected. Two universities received grants for both space and aeronautics design.

- more -

The grants are $32,000 per year for each new participant and $20,000 per year for each sustaining member, those schools having participated in a previous advanced design program. (Sustaining members are indicated below by an *).

The universities selected in the advanced aeronautics design include: Auburn University, Ala.; California Polytechnic State University at San Luis Obispo; California State Polytechnic University at Pomona; California State University at Northridge; Case Western Reserve University, Cleveland; University of Kansas, Lawrence; University of Notre Dame, Ind.; Ohio State University, Columbus; Purdue University, Lafayette, Ind.; and Worcester Polytechnic Institute, Mass.

The universities selected in the field of advanced space design are: University of Alabama, Huntsville; University of Arizona, Tucson; University of California at Los Angeles; University of Central Florida, Orlando; *University of Colorado, Boulder; *University of Florida, Gainesville; Florida A & M/Florida State University, Tallahassee; *Georgia Institute of Technology, Atlanta; University of Houston; University of Idaho, Moscow; Kansas State University, Manhattan; University of Maryland, College Park; *Massachusetts Institute of Technology, Cambridge; *University of Michigan, Ann Arbor; University of Minnesota, Minneapolis; Naval Postgraduate School, Monterey, Calif.; Ohio State University, Columbus; Old Dominion University, Norfolk, Va.; Pennsylvania State University, University Park; *Prairie View A & M University, Texas; University of Puerto Rico; Rensselaer Polytechnic Institute, Troy, N.Y.; *University of Texas at Austin; *Utah State University, Logan; *Virginia Polytechnic Institute and State University, Blacksburg; *University of Washington, Seattle; University of Wisconsin at Milwaukee; and *Worcester Polytechnic Institute, Mass.

NASA contributes funding for teaching assistants, visiting lecturers, technical materials and student travel to design review conferences. The next conference will be held in Huntsville, Ala., June 12-16, 1989. The conference provides an opportunity for students to present their design projects to their peers, university faculty and representatives of NASA.

The University Advanced Design Program is funded by NASA's Office of Aeronautics and Space Technology and is a collaborative effort with NASA's University Programs Branch, Educational Affairs Division.

- end -

NASA News

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June 2, 1989

RELEASE: 89-85

SMITH APPOINTED DEPUTY DIRECTOR, NASA STENNIS SPACE CENTER

The appointment of Gerald Smith as deputy director of NASA's John C. Stennis Space Center (SSC), Miss., was announced today by Center Director Roy Estess. Smith will assume his new duties on June 17.

Since 1986, Smith has managed the solid rocket booster project in the Shuttle Projects Office at NASA's George C. Marshall Space Flight Center (MSFC), Huntsville, Ala. In April 1985, he was detailed to NASA Headquarters, Washington, D.C., as acting chief, Engine Programs Branch, Shuttle Propulsion Division in the Office of Space Flight.

Smith joined MSFC in September 1961 as a member of the former Structures and Mechanics Division. From 1961 to 1963, he served in the U.S. Army and was then re-employed at Marshall in the Propulsion Division of the former Propulsion and Vehicle Engineering Laboratory.

In 1965, he left Marshall to work as a test and evaluation engineer in the Large Jet Engine Department at the General Electric Company. He returned to Marshall in 1967 as part of the center's structures and propulsion effort.

In 1974, he was assigned to the Office of the Associate Director for Engineering in the Science and Engineering Directorate. In 1983, he became deputy manager of the Space Shuttle maine engine project in the Shuttle Projects Office. In September 1984, he was appointed deputy associate director for engineering in the Science and Engineering Directorate.

Smith earned bachelor's and master's degrees in aeronautical engineering at Auburn University, Ala., and a master's degree in administrative science at the University of Alabama, Huntsville.

- end -

NASA News

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Washington, D.C. 20546
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June 5, 1989

Jim Elliott
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(Phone: 301/286-6256)

RELEASE: 89-86

TRACKING AND DATA RELAY SATELLITE-4 DECLARED OPERATIONAL

NASA's Tracking and Data Relay Satellite-4 (TDRS-4) became operational Saturday, officials at NASA's Goddard Space Flight Center (GSFC), Greenbelt, Md., announced today.

The 5,000-pound communications satellite assumed satellite communications responsibilities that were maintained by TDRS-1 since April 1983.

TDRS-1 now is being moved to a new location, 79 degrees west longitude, where it will serve as a backup to TDRS-4 and TDRS-3, also known as TDRS-East and TDRS-West, respectively. This move began Sunday at 11:30 a.m. EDT.

This switchover represents the completion of the three-satellite TDRS constellation. This new space-based system, used for communications with the Space Shuttle and other spacecraft in low-Earth orbit, offers great advantages over the worldwide network of ground stations used since the inception of the U.S. space program.

NASA's ground station network could only provide support for a small fraction -- typically 15 to 20 percent -- of each orbit period of the user spacecraft. The TDRS network covers at least 85 percent of each orbit period and facilitates a much higher information flow rate between the spacecraft and the ground.

"TDRS-4 will be located at 41 degrees west longitude just off the coast of Brazil, and TDRS-3 is on station over the Pacific south of Hawaii at 171 degrees west longitude," according to Charles T. Force, acting associate administrator for Space Operations, NASA Headquarters, Washington, D.C.

-more-

"TDRS-4's position was 47 degrees west longitude when it became operational. The satellite is drifting at 1 degree a day and is expected to reach its permanent location on June 10," according to Roger Flaherty, GSFC's TDRS network director.

The TDRS system of satellite communications will support up to 23 user spacecraft simultaneously and provide both multiple-access service that relays data from as many as 19 low-data-rate user spacecraft at the same time and a single-access service that provides two high-data-rate communications relays from each satellite. The final testing required for "service acceptance" of the total system is scheduled to be completed by the end of August.

The satellites are built by TRW, Redondo Beach, Calif., and are operated and owned by Contel Federal Systems, Fairfax, Va.

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NASA News

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For Release:

June 6, 1989

RELEASE: 89-87

AL DIAZ SELECTED AS DEPUTY ASSOCIATE ADMINISTRATOR FOR SCIENCE

Alphonso V. Diaz today was named NASA's deputy associate administrator for space science and applications, effective July 2.

In making the announcement, Associate Administrator for Space Science and Applications Dr. Lennard A. Fisk, said: "Al's extensive NASA management experience and technical involvement with planetary exploration make him a logical choice to serve as deputy. Al will be able to provide the Office of Space Science and Applications with internal expertise and a proven management ability."

Diaz leaves the position of division vice president for space and aeronautics services, General Electric Government Services, Cherry Hill, N.J. In this capacity, he was responsible for management of NASA-related services provided by GE at various NASA installations. He joined GE in July 1988.

Diaz agreed to return to NASA following discussions with NASA Acting Administrator Richard H. Truly and Dr. Fisk, who underscored to Diaz the agency's heavy space science schedule and the contributions Al could make because of his NASA and GE experience.

While previously at NASA, Diaz set up the organization within the Space Science Office for coordinating with NASA's Office of Space Station. He also had worked in NASA's Solar System Exploration Division. Diaz began his NASA career at the Langley Research Center, Hampton, Va., in 1964 as a cooperative education student. Later at Langley, he worked on the technical development of the Viking organic analysis experiment.

Diaz received a bachelor of science degree from St. Joseph's University in 1966; a master's degree in physics from Old Dominion University in 1970; and a master's degree in management from Massachusetts Institute of Technology as a NASA-sponsored Sloan Fellow in 1986. He was awarded the NASA Medal for Exceptional Scientific Achievement in 1977 for his work on the Viking experiment.

- end -

NASA News

National Aeronautics and
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June 7, 1989

Billie A. Deason
Johnson Space Center, Houston, Texas
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RELEASE: 89-88

HARTSFIELD TO HEAD SPACE FLIGHT/SPACE STATION INTEGRATION OFFICE

Veteran astronaut Henry Hartsfield has been assigned temporary duty in the Office of Space Flight, NASA Headquarters, Washington, D.C., effective immediately.

Hartsfield will serve as director of the Space Flight/Space Station Integration Office, reporting directly to the associate administrator for space flight.

Hartsfield replaces astronaut Robert Parker who has returned to the Johnson Space Center to begin training for his mission specialist assignment on Space Shuttle mission STS-35, scheduled for launch in the spring of 1990.

The Space Flight/Space Station Integration Office was established in 1987 to facilitate integration of the Space Station and its unique requirements into the Space Transportation System. The office coordinates the exchange of information between the two programs and serves as a forum for resolving technical and programmatic issues.

Hartsfield began his Air Force career in 1955 and is a graduate of the USAF Test Pilot School at Edwards Air Force Base, Calif. He was an instructor there prior to his assignment in 1966 to the USAF Manned Orbiting Laboratory (MOL) program as an astronaut. After cancellation of the MOL program in June 1969, he was reassigned to NASA. Hartsfield retired from the Air Force in August 1977 and remained in the astronaut corps. He was pilot for STS-4 in June/July 1982 and commanded Shuttle missions STS 41-D in September 1984 and STS 61-A in November 1985. His most recent assignment was deputy director for flight crew operations at the Johnson Space Center.

In addition to other awards, he has received the NASA Distinguished Service Medals in 1982 and 1988 and the NASA Exceptional Service Medal in 1988.

\- end -

NASA News

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Jeffrey Carr
Johnson Space Center, Houston
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June 9, 1989

RELEASE: 89-89

ASTRONAUT "PINKY" NELSON TO LEAVE NASA

Three-time space flight veteran George D. "Pinky" Nelson, Ph.D., will leave NASA on June 30 to accept academic and administrative positions at the University of Washington, Seattle. Nelson has been named assistant provost at the university as well as an associate professor of astronomy.

"I am excited with the prospects of a new challenge at the University of Washington in Seattle," Nelson said. "At the same time, I know that I will miss NASA and the Johnson Space Center, especially the people. I don't think there is a more dedicated, motivated and skilled group around. Thanks to everyone for making the past 11 years so enjoyable."

He added, "I hope to continue to promote the space program in my new career, because I believe that the exploration of space and the development of new technology is key to the future success of our civilization."

Nelson joined NASA with the first Shuttle-era astronaut selection in January 1978. While awaiting a flight crew assignment, he flew as scientific equipment operator aboard the WB-57F high-altitude research airplane, flew as chase plane photographer for Shuttle mission STS-1 and served as support crewman and Capcom for missions STS-3 and STS-4.

- more -

He made his first flight as a mission specialist aboard the Space Shuttle Challenger on mission STS 41-C in April 1984. The 41-C crew successfully deployed the Long Duration Exposure Facility and retrieved, repaired and replaced into orbit the ailing Solar Maximum Satellite. Nelson flew the Manned Maneuvering Unit and, with fellow crewman James "Ox" van Hoften, repaired and deployed the Solar Max during two spacewalks in the first space salvage operation in history.

Nelson flew again in January 1986 aboard Columbia on mission STS 61-C which featured the deployment of the SATCOM KU satellite, experiments in astrophysics and materials processing, and a night landing at Edwards Air Force Base, Calif.

In September 1988, Nelson made his third flight as a mission specialist aboard Discovery on the first post-Challenger mission, STS-26. Discovery's crew successfully deployed a Tracking and Data Relay Satellite (TDRS-C) and operated 11 mid-deck scientific experiments in returning the nation's Space Transportation System to flight.

Nelson has a total of 411 hours in space aboard three different Shuttle orbiters, including 10 hours of spacewalk.

- end -

NASA News

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June 12, 1989

Franklin O'Donnell
Jet Propulsion Laboratory, Pasadena, Calif.
(Phone: 818/354-5011)

RELEASE: 89-90

CHINESE ARTIFACT PROVIDES CLUE TO EARTH'S ROTATION

Ancient oracle bones, once believed to foretell day-to-day events in China, have been used by researchers at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., and their colleagues to help determine how much the Earth's rotation is slowing down.

Based on inscriptions on the oracle bones -- actually, tortoise shell -- the researchers have fixed the exact date and path of a solar eclipse seen in China in the year 1302 B.C. That, in turn, led them to conclude that the length of each day was 47/1,000ths of a second shorter in 1302 B.C. than it is now.

Their findings are reported in a talk delivered today by JPL astronomer Dr. Kevin D. Pang at the 174th meeting of the American Astronomical Society in Ann Arbor, Mich.

Working with Pang were East Asian language professor Hung-hsiang Chou of the University of California at Los Angeles, physicist Dr. Kevin Yau of Durham University in England, astronomer John A. Bangert of the U.S. Naval Observatory, Washington, D.C., and mathematician Dharam V. Ahluwalia of JPL.

The oracle bones studied by the researchers are pieces of tortoise shell used by seers during China's Shang Dynasty in the 14th century B.C.

The bones' existence was unknown to historians until 1899, when a Chinese scholar became ill and sent his servant to an apothecary for medicines. One of the ingredients -- sold by the apothecary as "dragon's bone" -- proved to be bone chips with words inscribed on them in ancient Chinese.

- more -

Over the following years, the bones' source was traced to the city of Anyang, about 300 miles southwest of Beijing. Anyang was the capital of the Shang Dynasty in ancient China.

Some 25,000 oracle bones were excavated in Anyang during the 1920s and 1930s and were taken to the Chinese Academy of Science in Taiwan when Chinese Nationalists moved there in 1949. About 135,000 more pieces are in private collections or have been excavated since the founding of the People's Republic of China. The oracle bone studied by Pang and his colleagues is part of the collection now in Taiwan.

The bone's inscription says, "Diviner Ko asks if the following day would be sunny or not." It was dated the 51st day of the cycle then in progress in the calendar system used continuously in China from time immemorial.

The bone is useful to astronomical researchers because it records not only the diviner's question but also the eventual outcome of the next day's weather. On the reverse side the inscription continues, " ... 52nd day, fog until next dawn. Three flames ate the Sun, and big stars were seen."

Pang and his colleagues interpreted that statement as a description of a total eclipse of the Sun. The "three flames" would be coronal streamers licking out from the Sun's surface, visible only during total eclipses. In addition, the masking of the Sun by the Moon would allow Earth observers to see stars during daytime.

The researchers faced a problem, however, because historical records were not complete enough to tell precisely from what year -- according to the modern calendar -- the oracle bones dated.

Using computers to calculate dates and paths of total solar eclipses visible in Shang China, the research team came up with two eclipses that might be the one referred to by the oracle bone. One of the eclipses was on June 5, 1302 B.C., the other on March 4, 1250 B.C.The researchers then turned to records of eclipses of the Moon in Shang Dynasty China to decide which of the two dates was right.

The seers who reported the lunar eclipses were known to work for King Wu Ding, who also was the patron of the seer who recorded the solar eclipse on the oracle bone. The lunar eclipses were known to span the years 1322 to 1278 B.C. That would cover the period of the solar eclipse of 1302 B.C., but not the solar eclipse of 1250 B.C.

- more -

The final step in their quest was to use a computer model of the Earth's rotation to see how fast the Earth must have been spinning for such an eclipse to be seen from Anyang, China, on the given day. If the Earth's rotation were faster or slower, the eclipse path would be moved to the east or west of Shang, China, and the total eclipse would not have been seen there.

According to Pang, the value they came up with -- a day 47/1,000ths of a second shorter in the 14th century B.C. -- is consistent with other studies of ancient eclipses from historical records.

Last year, Pang and several colleagues studied three eclipses reported in Chinese historical writings in 532 A.D., 899 B.C. and 1876 B.C. Their current study of the oracle bones, however, is the first time Pang's team has worked with an eclipse record from an archaeological artifact as opposed to ones in collected writings.

The research is not only useful in determining how fast the Earth's rotation has been gradually slowing down, Pang said, but also helps historians by establishing an exact date in the reign of King Wu Ding. Dates in Chinese history before the 9th century B.C. tend to be uncertain.

The research was supported by the Dudley Observatory of Schenectady, N.Y., and the U.S. Naval Observatory, Washington, D.C. Earth rotation and length-of-day information were provided by NASA's Office of Space Science and Applications, Washington, D.C.

- end -

NASA News

National Aeronautics and
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For Release:

June 12, 1989

RELEASE: 89-91

SOLICITATION PACKAGE RELEASED FOR USE OF TDRS C-BAND

NASA today released the solicitation package to organizations that have expressed interest in using the C-band capacity on two Tracking and Data Relay Satellites (TDRS) for international telecommunications purposes.

Eleven organizations have expressed interest in bidding for use of TDRS C-band services. The price of the C-band capacity will be established competitively. The deadline for bids is July 7, 1989.

Each satellite has twelve 36-Mhz C-Band transponders available. The agreement requires the user to purchase the capacity from all transponders on both satellites, located at 41 degrees west longitude and 171 degrees west longitude, for a period of 3 or 6 years. NASA's mission will have priority over the use of satellite system operations.

NASA will provide station-keeping control to 0.1 degree and operational tracking, telemetry and command for the spacecraft. The user will have responsibility for controlling and monitoring C-band transponder operations. Users must obtain all approvals required by law, regulation and/or international agreement prior to using the system.

Current NASA regulations, that provide for availability of TDRS services to non-U.S. government users, do not apply to C-band capacity.

The two TDRS spacecraft are part of NASA's new space-based network for tracking and communication with the Space Shuttle and other spacecraft in low-Earth orbit.

-end-

NASA News

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Jim Cast
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June 14, 1989

RELEASE: 89-92

NASA, AMROC AGREE TO CRITICAL CHEMICAL EXCHANGE

Under a recent agreement between NASA and the American Rocket Company (AMROC), Camarillo, Calif., NASA has provided a critical chemical to the company for its scheduled launch of a commercial Single Module Launch Vehicle (SMLV) from Vandenberg Air Force Base, Calif., in July.

AMROC's supply of hydrogen peroxide, used in the reaction control system of the SMLV, was found to be unusable upon delivery. Replacement by the overseas manufacturer could not be delivered in time for the launch date.

AMROC turned to NASA after exhausting attempts to acquire the chemical from other commercial sources. NASA uses hydrogen peroxide in its Scout launch vehicle reaction control systems. Within 2 weeks, after determining that its Scout vehicle supplies were adequate to cover near-term demands, NASA provided two drums (about 600 lbs.) of the chemical to AMROC.

"NASA's quick response and positive commitment aided us in holding our flight test schedules and target launch date for our customers," said George Koopman, president of AMROC. "This is the kind of partnership, cooperation and support the commercial expendable launch vehicle (ELV) industry wants and needs."

The chemical was provided to AMROC on a reimbursable basis from supplies at the Wallops Flight Facility, Wallops Island, Va. NASA will restore and expand its supply for Scout vehicles this fall. NASA is assisting the commercialization of the nation's fledgling ELV industry by making available use of its unique personal expertise, services and facilities that are not available from the private sector.

NASA also is purchasing its ELV launch services needs directly from commercial operators, whenever possible, to support its scientific and applications missions that are not assigned to fly on the Space Shuttle. Missions that do not require the unique capabilities of the Space Shuttle are being placed on ELVs in support of NASA's policy to use a mixed fleet of Shuttles and ELVs to assure access to space for its programs.

- end -

NASA News

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Washington, D.C. 20546
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Headquarters, Washington, D.C.
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June 14, 1989
EMBARGOED Until
2 p.m. EDT

RELEASE: 89-93

NASA ISSUES UPDATED MIXED FLEET MANIFEST

NASA today issued an updated mixed fleet manifest projecting current planning for primary payloads for Space Shuttle missions and expendable launch vehicles (ELV) through Fiscal Year 1995. In addition to the changes in the Space Shuttle flight sequence through STS-37 announced on May 12, this latest launch schedule continues to reflect NASA's commitment to the various science disciplines.

Following the successful launch of the Magellan spacecraft to Venus in May, the planetary schedule is maintained with the Galileo flight to Jupiter being readied for launch on Oct. 12, 1989, and the Ulysses mission to study the sun scheduled for October 1990. Additionally, the first of the great observatories, the Hubble Space Telescope, is now scheduled for launch aboard the orbiter Discovery in March 1990.

In support of Earth sciences, six additional Shuttle Solar Backscatter Ultraviolet (SSBUV) missions have been added to the line-up and the four previously-manifested SSBUV missions have been accelerated. The SSBUV instrumentation is a critical element in maintaining an accurate measurement of global ozone.

Other major science mission changes include provisions for additional Atmospheric Laboratory for Applications and Science flights, an Astro flight and a U.S. Microgravity Payload flight.

Recognizing the significance of recovering the Long Duration Exposure Facility (LDEF), a retrieval mission is slated for December of this year. The LDEF, a free-flying satellite carrying 57 science, technology and applications experiments, was deployed into orbit in 1984. After more than 5 years in space, LDEF -- in danger of being destroyed on reentry if not recovered by early 1990 -- is a valuable respository of information on space environmental effects.

- more -

The first three missions to begin assembling Space Station Freedom are baselined in the new flight schedule in 1995. Also planned are two Flight Telerobotic Servicer-Demonstration Test Flights, a system being developed for the space station to assist in assembly, service and inspection of the manned base and attached payloads.

In the international programs area, a third European Retrievable Carrier (Eureca-3L) is now slated for launch in May 1995. Eureca is a platform to be placed in orbit for 6 months, offering conventional services to experimenters.

Two additional Spacehab modules have been booked, bringing the total number of planned flights to 6. The Spacehab is a commercially owned, pressurized module for conducting experiments in a human-tended environment.

The new manifest also features six Shuttle "flight opportunities," beginning in 1992. Use of these flight opportunities by payloads which slip out of their planned time frame will minimize major manifest revisions and promote greater schedule stability in payload programs.

NASA continues to employ ELVs for payloads not requiring the use of the Shuttle. Three new launches have been added to the ELV line-up in 1995 including the Solar Heliospheric Observatory aboard an Atlas II, a Geostationary Operational Environmental Satellite on an Atlas I and the Comet Rendezvous Asteroid Flyby marking NASA's first use of a Titan IV.

- end -

EDITORS NOTE: The June 1989 NASA Mixed Fleet Manifest is available in the NASA Headquarters and field center newsrooms.

NASA News

National Aeronautics and
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June 14, 1989

Jerome D. Rosenberg
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RELEASE: 89-94

NASA PROGRAMS GENERATE MORE THAN 300,000 JOBS, STUDY SHOWS

NASA activities generate more than 300,000 full-time jobs across all 50 states, according to a recent study undertaken for the agency by the NASA Alumni League. The study indicates that the money NASA spends for space and aeronautics research has a very significant impact on national employment, both direct and indirect.

The findings are based on a detailed study conducted for the Alumni League by Management Information Services, Inc. (MISI), Washington, D.C. Using conservative national economic models and examining only part of the NASA budget, the study predicts that some 237,000 jobs in private industry are generated by a NASA spending level of $11.3 billion. When the Alumni League expanded the scope to include the civil service work force, the support services required by NASA's field centers, and certain production and management operations not covered in the MISI study's economic model, the total increased to more than 300,000 jobs.

Copies of the study are available from the NASA Alumni League, 922 Pennsylvania Ave., S.E., Washington, D.C. 20003; phone 202/543-3587. A limited number of copies are available to the news media from the NASA Headquarters Newsroom, Room 6043, 400 Maryland Ave., S.W., Washington, D.C. 20546; phone 202/453-8400.

- end -

NASA News

National Aeronautics and
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Washington, D.C. 20546
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C. J. Fenrick
Ames Research Center, Mountain View, Calif.
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For Release:

June 13, 1989

C89-J: NASA SELECTS BENDIX FOR COMPUTER CONTRACT NEGOTIATION

NASA's Ames Research Center, Mountain View, Calif., has selected Bendix Field Engineering Corp., Columbia, Md., for final negotiations leading to award of a contract for information and communications support services.

The proposed 5-year contract will be a cost-plus-award-fee type with an estimated value of $32.7 million for the basic 2-year period, a 1-year priced-option period and a final 2-year priced option period.

The contractor will provide personnel, material, equipment and other resources necessary to perform the operation, maintenance, test, repair and modification of the existing voice telephone system, message center, tele-conferencing system, radio equipment, cable plant, audio/video system, data communications system, network control system and personal computer support. These services will be used to support numerous programs and projects at NASA's Ames Research Center.

- end -

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For Release:

June 13, 1989

C89-K: NASA SELECTS COMPUTER FIRMS FOR CONTRACT NEGOTIATIONS

NASA's Ames Research Center, Mountain View, Calif., has selected four companies for contract negotiations for the acquisition of general purpose, interactive computer systems.

The companies selected are Convex Computer Corp., San Jose, Calif.; Digital Equipment Corp., Landover, Md.; Silicon Graphics, Inc., Mountain View; and Sun Microsystems Federal, Inc., Mountain View.

This acquisition will initiate new firm-fixed-priced requirements-type contracts for work to be performed at Ames Research Center. At least four contracts will be awarded. The period of performance will consist of a 3-year base period with two 2-year priced options. The estimated total cost of the multiple awards over the 7-year period will be $97 million.

The general purpose interactive computers being acquired include single- and multi-user systems. The companies selected will provide the necessary hardware, software, maintenance, support and training to fulfill researcher requirements.

- end -

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For Release:
June 15, 1989

RELEASE: 89-95

U.S./SOVIET SPACEBRIDGE PROJECT EXTENDED TO ASSIST TRAIN VICTIMS

NASA's Life Sciences Division, Washington, D.C., announced today that the Spacebridge project with Armenia, USSR, will be extended to Moscow and Ufa to assist the victims of a recent accident involving two trains destroyed by a gas explosion outside the Soviet city of Ufa in the Ural Mountains.

Spacebridge currently links medical facilities and doctors in Yerevaon, Armenia, with U.S. doctors in Bethesda and Baltimore, Md., Houston, and Salt Lake City, Utah.

Since May 1, dozens of physicians have been meeting from 9 a.m. to 1 p.m. EDT (6 p.m. to 10 p.m. Armenian time), Monday through Friday, to discuss difficult medical cases resulting from the Armenian earthquake disaster. Each case presented is representative of many people suffering the same medical problems. Some cases involve people who lost limbs in the disaster and now need prostheses, reconstructive surgery or rehabilitation. These daily Spacebridge sessions will continue through June 29.

Linked by satellite, the doctors have access to audio, visual and facsimile communications capability at NASA Headquarters in Washington, D.C., the Republic Diagnostic Center Yerevan, Armenia, outside the disaster zone, the Uniformed Services University of the Health Sciences in Bethesda, the University of Maryland Institute of Emergency Medical Services System in Baltimore, the University of Texas Health Science Center in Houston, the University of Utah and LDS Hospital in Salt Lake City.

The new link with Moscow and Ufa will extend the U.S. medical expertise being used particularly in the area of burn treatment. The Soviet Ministry of Telecommunications will provide the technical communications link between Moscow, Ufa and Yerevaon. The new communciations capabilities will be patched into the existing Spacebridge network.

- more -

The procedures are expected to be similar to those used for the past 6 weeks to consult on the Armenian earthquake victims. Each day, Armenian doctors prepare their cases according to an agenda that sets the subject for each day's consultation, faxing data on the cases to U.S. participants before each session begins.

During the consultation, the Armenian doctors present their cases one by one, sometimes with the patient on hand, displaying x-rays, CT scans and other relevant data. Doctors at the U.S. medical centers then make recommendations for treatment or further study.

Many of the Armenian cases discussed to date concern injuries requiring reconstructive or plastic surgery, orthopedics or prosthetics. Post-traumatic stress disorders also account for cases requiring psychiatric or psychological treatment. Many of these consultations have focused on public health issues such as sanitation problems and epidemiological concerns.

The Spacebridge has turned out to be a very successful endeavor according to NASA and other participating American physicians in the four medical centers. Extending the program to assist the train victims will further enhance U.S./USSR relationships. This program also serves future space exploration by providing Spacebridge participants with knowledge of how to conduct a complicated telemedicine consultation as might occur on a space station.

- end -

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For Release:
June 15, 1989

RELEASE: 89-96

NASA GODDARD TO OPEN SPACE ROBOTICS ADVANCED TECHNOLOGY FACILITY

NASA's Goddard Space Flight Center, Greenbelt, Md., will open its new state-of-the-art robotics facility with a ribbon-cutting ceremony on Tuesday, June 20, 1989. The facility will play an important role in developing a space robot to do things never before done in space.

The ribbon-cutting ceremony will begin at 10 a.m. EDT at the Building 11 facility. A demonstration of the facility's robotics capabilities will follow the ceremony.

The highly sophisticated facility will be used by Goddard's robotics team to create, test and evaluate new robotic technologies to support Space Station Freedom.

As part of the Freedom project, Goddard manages the development of the Flight Telerobotic Servicer (FTS), a robotic device that combines teleoperation -- the using of a human operator to direct the machine -- and autonomous capabilities for performing tasks by itself but supervised by an astronaut. Martin Marietta Space Systems Co., Denver, Colo., was selected by NASA to develop the FTS.

"The FTS will allow astronauts to accomplish routine work in space," said Ronald Browning, Goddard's deputy director for Space Station Freedom. "FTS is designed to complement astronaut extravehicular activity and will be used both with and without a crewman."

The new facility contains a gantry robot 40 feet wide, 60 feet long and 20 feet high with six degrees of freedom, capable of lifting up to two tons of payload and applying 4000 foot-pounds of torque.

- more -

Suspended from one mast of the gantry will be a set of teleoperated industrial arms, which will be used as an FTS operational simulator. Another mast carries a grapple to emulate Freedom's remote manipulator system, which primarily will be used to transport payloads to and from the work site.

The facility also includes an operator work station installed in a mockup of the Space Shuttle's aft flight deck. This simulator will permit teleoperation of the robot, providing valuable information about operating the FTS in the constrained environment of the Shuttle.

Located in a glass enclosed mezzanine, overlooking the gantry robot, is what David Provost, head, robotics data systems and integration section, calls one of the unique technologies being developed by Goddard for the FTS project -- the Graphic Robot Simulator.

"This computerized simulator uses animated graphics to determine such things as the robot's reach capability and collision avoidance information," said Provost. "It allows our engineers to use engineering and design concepts to evaluate what would be seen at Freedom Station 6 or 7 years from now.

"The simulator is a very cost-effective system. It reduces the construction costs considerably for major spacecraft and instrument subsystems and makes results available in a much shorter time."

Also located in the facility is a robotics test bed for the evaluation of various computers, software, mechanical arms and control devices.

Commenting on the utilization of the robotics facility with the FTS project, Stanford Ollendorf, chief, telerobotics engineering office, said, "Goddard has been given a technical challenge to build a robot to do things which have never been done before in space."

"With this facility and the team of specialists from universities, industry and other NASA centers, Goddard will have a positive impact not only on Freedom Station and the nation's space program but also on the U.S. ability to compete in world markets through technology transfer to private industry," Ollendorf continued.

- end -

EDITORS NOTE: Media representatives planning to attend this ceremony are requested to call the Goddard Space Flight Center newsroom at 301/286-5565.

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For Release:
June 15, 1989

RELEASE: 89-97

NASA SCIENTISTS IDENTIFY MOLECULAR STRUCTURE OF BLOOD PROTEIN

Scientists at NASA's Marshall Space Flight Center, Huntsville, Ala., have solved a mystery that may help in the design of new or improved disease-fighting drugs.

Using a technique known as X-ray crystallography, a team of scientists and technicians, headed by Dr. Daniel C. Carter, has successfully determined the three-dimensional structure of human serum albumin, the most abundant plasma protein in the human circulatory system. Knowing the molecule's structure may allow pharmaceutical companies to design new drugs or alter existing drugs to allow them to be more efficiently carried by the protein molecule through the body.

Compiling the images of hundreds of individual X-ray diffraction experiments, Carter of the Marshall Center's Space Science Laboratory, and colleague Dr. Xiao-min He, Universities Space Research Association (USRA), identified the plasma protein as a large, ellipsoidal molecule of six bundles of intertwining spirals of amino acids. USRA is headquartered in Columbia, Md.; Dr. He works at USRA's Huntsville, Ala., office.

The scientists have successfully mapped and confirmed the structure of the protein to a resolution of six angstroms, providing an image with enough detail to extract data about individual molecules. The scientists' next step will be to further refine the resolution to three angstroms using space-grown crystals. This higher resolution will help identify individual spirals in each bundle of the molecule, a process that may take 1 to 2 years.

- more -

Human serum albumin crystals have been grown twice in space, most recently during Shuttle mission STS-26 last September as part of a Marshall-managed protein crystal growth experiment.

Identifying the structure of human serum albumin has been the goal of crystallographic investigations for many years. Many studies have focused on the protein's ability to bind to other substances.

"We knew that the protein binds and transports a wide variety of substrates in plasma, such as calcium, copper, fatty and amino acids, hormones and an impressive spectrum of therapeutic drugs," said Carter. "Now, knowing the structure, we can determine where on the molecule these substrates bind. For instance, preliminary binding studies of several compounds, including common aspirin, have shown that many compounds are transported inside just two of the molecule's segments, or bundles: the first and fifth."

Many existing drugs are now less effective or entirely ineffective because their molecular structures either fail to bind or bind too tightly with the protein, said Carter. The metabolism, distribution and effectiveness of many pharmaceuticals can be significantly altered based on their affinity for human serum albumin. Therefore,scientists believe the knowledge of the three-dimensional structure, and how and where the substrates bind on the molecule, may significantly change the industry's approach to drug design.

"Most of the hard work is behind us," said Carter. "Now that we know how to obtain this resolution, it's a matter of systematically refining the details. But scientists will be studying applications for the protein molecule for a long time."

In addition to Carter and He, other members of the science team included Teresa Y. Miller, Marshall Space Flight Center, and Sibyl H. Munson, Pamela D. Twigg, Kim M. Gernert and M. Beth Broom, all under contract with USRA, a non-profit consortium of universities involved in space science research.

- end -

Notes to Editors:

Still photos of the actual molecule are available from Marshall Space Flight Center, 205/544-0034.

A short video clip of STS-26 crew members working on the Protein Crystal Growth Experiment is available from NASA Headquarters, Washington, D.C., 202/453-8375. Still photos of the STS-26 crew activity are available from Johnson Space Center, Houston, 713/483-5111.

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For Release:

June 15, 1989

RELEASE: 89-98

CONTRACTOR CHOSEN FOR STENNIS FACILITY OPERATING SUPPORT SERVICES

NASA has selected Pan Am World Services, Inc., Cape Canaveral, Fla., for final negotiations for a contract to provide facility operating support services at the John C. Stennis Space Center, Hancock County, Miss.

The proposed cost-plus-award-fee contract consists of a basic period of 1 year and priced options for seven additional 1-year periods. It is anticipated that the contract will be initiated in August 1989 and have a total estimated value of $360 million.

Major subcontractors include Bamsi, Inc., Titusville, Fla.; B&W Services, Bay St. Louis, Miss.; and Williams Wrecking & Construction, Gulfport, Miss.

Services covered by the contract consist of the operation and maintenance of government facilities for NASA and other government agencies in residence at Stennis, including support of NASA's program of rocket engine development, static testing and certification, as well as support for NASA's space science applications and environmental activities.

Pan Am World Services has been providing similar services to Stennis since 1978.

- end -

NASA News

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For Release:
June 16, 1989

RELEASE: 89-99

CONTRACTORS SELECTED FOR ADVANCED LAUNCH SYSTEM STUDIES

NASA's Marshall Space Flight Center, Huntsville, Ala., has announced the selection of three firms for negotiations leading to award of contracts for systems definition studies of two proposed new liquid-propellant rocket engines.

The definition study efforts are part of the Space Transportation Engine Program, which could lead to development of the rocket engines to meet requirements of the Department of Defense/NASA Advanced Launch System program and other future U.S. launch system needs.

The Advanced Launch System is intended to provide, by the 1998-2000 time period, a dependable, reliable, high-capacity national launch capability while reducing by a factor of 10 the cost of placing payloads in Earth orbit.

Each contract is expected to be valued at approximately $20 million and will be a 36-month effort. The firms selected for contract negotiations are Aerojet General Corp., Sacramento, Calif.; Pratt & Whitney Division of United Technologies Corp., West Palm Beach, Fla.; and Rocketdyne Division of Rockwell International, Canoga Park, Calif.

The engines to be defined for the Space Transportation Engine Program are:

o The Space Transportation Main Engine, which would use liquid hydrogen and liquid oxygen propellants and achieve a thrust level (in vacuum) of approximately 580,000 pounds. The main engine would be used in the Advanced Launch System core stage and might also be employed in a booster application.

- more -

o The Space Transportation Booster Engine, which would use liquid methane and liquid oxygen propellants for a thrust (at sea level) of approximately 500,000 to 650,000 pounds. The booster engine is envisioned as a derivative of the Space Transportation Main Engine, rather than a unique design. A decision will be made later about whether this engine or the Space Transportation Main Engine will be used in the Advanced Launch System booster stage.

The emphasis in systems definition of both engines will be on use of innovative designs and approaches that will yield higher reliability, lower production cost and lower operational cost in the resulting engines, compared to existing liquid propellant rockets. Both engines are to be designed for either reusable or expendable application.

The definition study efforts will involve analyzing configuration options and associated tradeoffs and preparing preliminary designs, at the system, subsystem and component levels, for the two engine concepts.

The three contracts to result from current negotiations will be closely coordinated with ongoing propulsion advanced development contracts aimed at demonstrating and providing sufficient maturity for new propulsion technologies which could be fed into the engine systems. A selection of firms for negotiations leading to contracts in that area was announced by NASA in March 1989.

- end -

NASA News

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For Release:
June 20, 1989

RELEASE: 89-101

TWO COMPANIES CHOSEN FOR WORK ON LIFE SCIENCE SATELLITE

NASA's Johnson Space Center, Houston, has selected two companies to continue the study and design of an unmanned, reusable reentry satellite called LifeSat (Life Science Satellite).

General Electric, Reentry Systems Department, Philadelphia, and Science Applications International Corp., Torrance, Calif., were chosen for the two parallel $900,000 contracts. The 1-year agreements are tentatively scheduled to start July 3, 1989.

LifeSat will carry life science payloads and could significantly expand NASA's capability to investigate the biological effects of microgravity and the unique space radiation environment. This type of investigation can be calculated only in space, preferably in polar orbits. LifeSat will be used primarily in the fields of life sciences and materials processing.

LifeSat will fly experiments in a variety of orbits, including those providing high doses of radiation, for up to 60 days, and perhaps longer. It would be placed into Earth orbit by an expendable launch vehicle, reserving the Space Shuttle for activities requiring crew presence. Upon completion of the mission, LifeSat would reenter the atmosphere and soft-land at a designated ground-site where scientists and engineers would have immediate access to the experiments.

The request for proposals, released in January, called for the design of a reusable spacecraft that could be processed and readied for reflight in 2 months, allowing for several flights each year.

The project is managed by the Flight Projects Office of the New Initiatives Office at the Johnson Space Center.

- end -

NASA News

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For Release:
June 23, 1989

RELEASE: 89-102

COMMERCIAL LAUNCH SERVICES SYMPOSIUM HELD

On June 19, NASA hosted a commercial launch services symposium in Washington, D.C., in an effort to better understand specific industry concerns about the agency's procurement practices and procedures relating to commercial launch services.

Two-thirds of the potential domestic commercial launch services companies accepted NASA's invitation to address government-wide officials on current developments in the fledgling commercial expendable launch vehicle (ELV) industry itself; on policies and procedures considered to be objectionable in recent NASA commercial ELV solicitations; on ways to streamline or tailor individual solicitation requirements to specific needs while adequately safeguarding the government's interests; and on identifying specific legislation needed to procure ELV services on terms and conditions more suitable to the industry.

During the all-day session, presenting companies included: Space Services, Inc.; McDonnell Douglas Astronautics; Conatec; Martin Marietta Aerospace, CTI; E'Prime Aerospace; LTV; General Dynamics, Space Systems Division; and American Rocket Company.

During the next symposium, yet to be scheduled, the government will respond to the myriad comments and suggestions received during the June 19 session.

Reference points for industry comments were NASA's first two commercial ELV procurement actions: the National Oceanic and Atmospheric Administration's series of Geostationary Operational Environmental Satellites commercial launches, awarded to General Dynamics in 1988; and NASA's latest competition, last May, for commercial medium performance class launch services for up to 15 missions. Proposals received under the latter solicitation are presently being evaluated.

- more -

As a matter of policy, NASA is purchasing future ELV launch services directly from commercial operators, whenever possible, to support its scientific and applications mission that are not assigned to fly on the Space Shuttle. Missions that do not require the unique capabilties of the Shuttle are being placed on ELVs so that a mixed fleet of shuttles and ELVs will be available to assure access to space for NASA programs.

- end -

NOTE TO EDITORS: A two-page backgrounder on the symposium is available in the NASA Headquarters Newsroom (Phone: 202/453-8400).

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For Release:

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June 27, 1989

RELEASE: 89-103

TANNER TO LEAVE NASA

E. Ray Tanner, Deputy Director, Space Station Freedom Program and Operations, announced today he plans to retire from NASA effective July 15, 1989.

Dr. William B. Lenoir, Associate Administrator for Space Station named Jim Sisson as acting Deputy Director. Sisson currently serves as Deputy Program Manager for the Space Station Freedom Program Office located in Reston, Va., a position he has held since November 1986.

Prior to coming to NASA Headquarters, Sisson held key management posts at the Marshall Space Flight Center, Huntsville, Ala., where he was for 24 years, including Manager of the Tethered Satellite System Project, Manager of the Shuttle Projects Office's Engineering and Major Test Management Office and Chief Engineer and later Manager of the Lunar Roving Vehicle Project. He received a bachelors degree in aeronautical engineering in 1958 from Oklahoma University, and studied atomic and nuclear physics at the University of Alabama.

Tanner came to the Washington area last December to head the Space Station Freedom Program Office in Reston, Va. Prior to that, Tanner was Manager of the Space Station Projects Office at the Marshall Center which is one of four major work packages involved in the design, test and operation of the Freedom Space Station, a post he had held since August 1988.

Tanner joined NASA and the Marshall center in 1960. He held various key management positions, including chief engineer for the Spacelab program from 1979 until 1983, and Deputy Manager of the Spacelab Program Office from 1983 until 1986. He was named Associate Director for Space Systems in the Science and Engineering Directorate in December 1986.

-more-

He was promoted to Deputy Director for Space Systems in that directorate where he was responsible for assuring engineering adequacy of the Space Station, Hubble Space Telescope, Advanced X-Ray Astrophysics Facility, payloads integrated into the Spacelab orbital laboratory and other payloads assigned to Marshall.

Prior to joining NASA, Tanner worked in the flight control division, Army Ballistic Missile Agency, Redstone Arsenal. He was born in Decatur, Ala., in 1934 and received a bachelor of science degree in mathematics from Athens College, Ala., in 1965. He has received numerous NASA awards, including the NASA Exceptional Service Medal in 1983.

Tanner is married to the former Mary Zinsmeister of Cullman, Ala. They have three children.

-end-

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For Release:

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RELEASE: 89-104

NASA SELECTS SCIENCE EXPERIMENTS FOR SPACE STATION FREEDOM

NASA's Office of Space Science and Applications today announced the selection of 27 flight experiments, or concept studies leading to experiments, that will fly aboard the Space Station Freedom.

The selections fall into two categories. The flight category is for attached scientific experiments that can be mounted aboard elements of Freedom's structure during its assembly and outfitting phase. The 14 investigations selected in this category will be the first performed aboard Freedom. Flight proposals were solicited that would be limited in weight and make only modest demands on station resources, such as power, cooling and crew availability, during the busy assembly phase.

The concept study category is for studies that may lead to flight experiments after the assembly phase. These proposals were solicited for more advanced ideas that could be implemented after station assembly when additional resources, such as higher power and data-handling capabilities, will be available.

Some of the 14 flight experiments and 13 concept studies call upon two facilities the Office of Space Science and Applications has indicated would be built for Freedom. These are Astromag, a cryogenically-cooled superconducting electromagnet to measure cosmic rays, and the Cosmic Dust Collection Facility, which will capture and record the direction and velocity of cosmic dust particles for further analysis.

The 27 selections were made from responses to two NASA announcements of opportunity issued in 1988. The first, issued in January, was for the Earth Observing System (EOS) and solicited proposals for both the unmanned NASA Polar Orbiting Platform and the permanently manned Space Station Freedom. The second was issued in July and was specifically for scientific and technological payloads in other scientific disciplines to be attached to Freedom. Eight of the nine Earth science investigations selected as attached payloads involve copies of EOS Polar Platform instruments.

- more -

The investigations include participants from about 50 organizations representing NASA and other government and private research centers, U.S. universities and five foreign countries. The selected experiments and concepts represent a wide range of scientific disciplines including space physics, solar and planetary physics, exobiology, astrophysics, Earth and environmental science and communications technology. They involve nearly 130 scientists.

Selection of the flight experiments was predicated on their ability to meet a timetable for the design, development and assembly of Freedom elements. The earliest expected flight date for any of the experiments is 1996. The Freedom Station will provide physical attachment points, power, cooling, data communications and pointing for certain instruments.

The Attached Payload Program is managed by the Office of Space Science and Applications, Flight Systems Division. Program manager is Dr. Philip J. Cressy, and program scientist is Dr. Stanley C. Freden, both at NASA Headquarters.

The following individuals have been selected for funding for experiments and concept studies in response to the January 1988 announcement:

Dr. Robert M. Walker, McDonnell Center for the Space Sciences, Washington University, St. Louis, Cosmic Dust Experiment, flight experiment.

Dr. Michael Fitzmaurice, Goddard Space Flight Center, Greenbelt, Md., Laser Communications Transceiver, flight experiment.

Dr. Paul Gorenstein, Smithsonian Astrophysical Observatory, Cambridge, Mass., Large Area Modular Array of Reflectors/High Throughput X-Ray Astronomy Instrument, flight experiment.

Dr. Thomas A. Parnell, Marshall Space Flight Center, Huntsville, Ala., Spectra, Composition and Interactions of Nuclei above 10 TeV, Astromag experiment, flight experiment.

Dr. Jonathan F. Ormes, Goddard Space Flight Center, Greenbelt, Md., Large Isotope Spectrometer for Astromag, flight experiment.

Dr. Glenn C. Carle, Ames Research Center, Moffett Field, Calif. Exobiology Intact Capture Experiment, flight experiment.

Dr. Siegfried Auer, Applied Research Corporation, Landover, Md., Cosmic Dust Orbit and Capture Experiment, flight experiment.

Dr. Robert L. Golden, Particle Astrophysics Laboratory, New Mexico State University, Las Cruces, Measurement of Cosmic Rays including Anti-protons, Positrons, Anti-nuclei and a Search for Primordial Antimatter, Astromag experiment, flight experiment.

Dr. Arthur B. Walker, Jr., Center for Space Science and Astrophysics, Stanford University, Calif., Ultra-High Resolution XUV Spectroheliograph, flight experiment.

Dr. W. T. Sanders, Space Science and Engineering Center, University of Wisconsin at Madison, X-ray Background Survey Spectrometer, flight experiment.

Dr. Peter B. Price, Space Science Laboratory, University of California at Berkeley, Heavy Nuclei Collector, flight experiment.

Dr. Peter M. Banks, STAR Laboratory, Department of Electrical Engineering, Stanford University, Calif., Plasma Interactions Experiment, concept study.

Dr. Michael Shao, Optical Sciences and Applications Section, Jet Propulsion Laboratory, Pasadena, Calif., Orbiting Stellar Interferometer, concept study.

Dr. Robert D. Reasenberg, Smithsonian Astrophysical Observatory, Cambridge, Mass., Precision Optical Interferometry in Space Study, concept study.

Dr. Jonathan E. Grindlay, Harvard College Observatory, Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass., Energetic X-ray Observatory for Space Station, concept study.

Dr. Robert L. Brown, National Radio Astronomy Observatory, Charlottesville, Va., High-Resolution Imaging Spectroscopy at Tera Hertz Frequencies, concept study.

Dr. Hugh S. Hudson, Center for Astrophysics and Space Sciences, University of California, San Diego, Pinhole/Occulter Facility, concept study.

Dr. Guy Fogleman, SETI Institute, Ames Research Center, Moffett Field, Calif., Study to Develop an Active Collector of Cosmic Dust, concept study.

The following investigators were selected from responses to the July 1988 announcement:

Dr. M. Patrick McCormick, Langley Research Center, Hampton, Va., Stratospheric Aerosol and Gas Experiment III, flight experiment.

Dr. Hugh Christian, Marshall Space Flight Center, Huntsville, Ala., Lightning Imaging Sensor, flight experiment.

Dr. Bruce Barkstrom, Langley Research Center, Hampton, Va., Clouds and the Earth's Radiant Energy System, flight experiment.

Dr. William L. Barnes, Goddard Space Flight Center, Greenbelt, Md., Tropical Region Imaging Spectrometer, concept study.

Dr. Michael H. Freilach, Jet Propulsion Laboratory, Pasadena, Calif., Advanced Scatterometer for Studies in Meteorology and Oceanography, concept study.

Dr. Tiruvalam Krishnamurti, Florida State University, Tallahassee, an experiment similar to the Laser Atmospheric Wind Sounder, one of six facility instruments included in the Polar Platform proposal, concept study.

Dr. William G. Melbourne, Jet Propulsion Laboratory, Pasadena, Calif., Global Positioning System Geoscience Instrument, concept study.

Dr. Gerald R. North, Texas A&M University, College Station, Tropical Rain Mapping Radar, concept study.

Dr. Roy Spencer, Marshall Space Flight Center, Huntsville, Ala., Tropical Geophysical Information Retrieval with a High Resolution Microwave Spectrometer Sounder, concept study.

- end -

NOTE: A complete list of payload co-investigators is available from the NASA Newsroom, Room 6043, 400 Maryland Ave., S.W., Washington, D.C. 20546, phone 202/453-8400.

NASA News

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For Release:

June 29, 1989

RELEASE: 89-106

NASA SPACE SHUTTLE CREW ASSIGNMENTS ANNOUNCED

USAF Col. John E. Blaha has been named to the flight crew of Shuttle mission STS-33, a Department of Defense dedicated flight targeted for November 19, this year. He replaces USNR Rear Admiral S. David Griggs, who was killed on June 17 when the private plane he was flying crashed in eastern Arkansas.

Blaha joins crew commander USAF Col. Frederick D. Gregory and mission specialists F. Story Musgrave, M.D., Kathryn C. Thornton, Ph.D., and USN Capt. Manley L. "Sonny" Carter, Jr., M.D., who have been training since November, last year. The replacement is not expected to impact the launch date.

Blaha previously had been assigned as the pilot for STS-40, a space and life sciences dedicated mission (SLS-1). Replacing Blaha as pilot for STS-40 is USAF Maj. Sidney M. Gutierrez. Planned for launch in August 1990, the 7-day flight will feature space and life sciences studies in the SLS-1 laboratory module aboard the Space Shuttle Columbia.

Gutierrez joins crew commander USMC Col. Bryan D. O'Connor, mission specialists M. Rhea Seddon, M.D., James P. Bagian, M.D., and Tamara E. Jernigan, Ph.D., and payload specialists F. Drew Gaffney, Ph.D., and Robert W. Phillips, Ph.D, all previously named.

In another flight crew assignment, Mary L. Cleave, Ph.D., and Norman E. Thagard, M.D., have been named as mission specialists for STS-42, a 9-day flight aboard Columbia, targeted for December 1990. The partial crew assignment will allow for long range crew participation in payload training and integration associated with the International Microgravity Laboratory (IML-1). The remainder of the 7-member crew will be named later.

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Blaha made his first space flight as pilot aboard Discovery on mission STS-29 in March, this year. He was born Aug. 26, 1942, in San Antonio, Texas.

Gutierrez, making his first flight in space, was born June 27, 1951, in Albuquerque, NM. Cleave will make her third space flight, having flown previously as mission specialist on STS 61-B in November, 1985, and on STS-30 in May, this year. She was born February 5, 1947, in Southampton, N.Y.

Thagard will make his fourth space flight. He flew as mission specialist on STS-7 in June 1983, on STS 51-B in April 1985, and on STS-30 in May, this year. Thagard was born July 3, 1943, in Marianna, Fla., but considers Jacksonville, Fla., to be his hometown.

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Editors Note: A summary of Space Shuttle flight crews currently in mission training can be obtained by calling NASA Headquarters newsroom at 202/453-8400.

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BOEING, MARTIN MARIETTA TO STUDY SPACE TRANSFER VEHICLE CONCEPTS

NASA's Marshall Space Flight Center, Huntsville, Ala., has selected Boeing Co., Seattle, Wash., and Martin Marietta Corp., Denver, Colo., for negotiations leading to award of contracts to study Space Transfer Vehicle (STV) concepts.

These studies will investigate a high-performance space vehicle system capable of ferrying large, automated payloads from Space Station Freedom to geosynchronous orbits, the Moon or other planets. The cryogenically fueled system also may evolve to support manned missions to the moon or Mars.

These contracts are for 18-month Phase A studies with options for extensions up to 3 years. The total value of each contract, with options, is up to $5 million.

STV, successor to a previous concept known as the Orbital Transfer Vehicle, is targeted for initial operational capability in 1999. The vehicle may be carried to orbit by a variety of means, including the Space Shuttle, the proposed Shuttle-C or future advanced launch systems.

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